THE AMERICAN GAS LIGHT JOURNAL

PUBLISHED WEEKLY, AT No. 42 PINE STREET.

VOLUME C., No. 15.
Whole No. 2,027.

NEW YORK, MONDAY, APRIL 13, 1914.

Subscription, $3 Per Year.
$4 Canada, $5 Foreign.

INDEX TO CONTENTS, PAGE 225. - - - - - - - ADVERTISERS' INDEX, PAGE 22.

LIBRARY OF CONGRESS,
APR 14 1914
SMITHSONIAN DEPOSIT.

Riter-Conley Manufacturing Company

STEEL CONSTRUCTION

Pittsburgh

THE UNITED GAS IMPROVEMENT COMPANY,

PHILADELPHIA.

—•—

BUILDERS OF

THE STANDARD DOUBLE SUPERHEATER

LOWE WATER GAS APPARATUS.

—•—

ACCURATE MEASUREMENT

OF

AIR AND STEAM SUPPLY

(PATENTED),

AFFORDING { PERFECT CONTROL OF GENERATOR FIRE CONDITIONS.

PRODUCING { UNIFORM RESULTS. HIGHEST EFFICIENCIES.

LIBRARY OF CONGRESS,
APR 14 1914
SMITHSONIAN DEPOSIT.

THE AMERICAN
GAS LIGHT JOURNAL
INC.

VOL. C., No. 15. NEW YORK, APRIL 13, 1914. WHOLE No. 2,027.

CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

Gas Investigations of the Bureau of Standards, by Mr. R. D. McBride 225
Forty-fourth Meeting, New England Association of Gas Engineers—[Official Report—Continued from Page 218]. 227
First Day, Morning Session—Intensifying Output, by Mr. H. C. Crafts—Discussion—Calling on Mr. Gartley to Speak—Report from Committee on Nominations—Election of Officers—Responses from Officers-Elect.
*The Installation of Cast Iron Mains, by Walton Forstall—Continued from Page 220..... 230
OFFICIAL NOTICE—
Sixth Meeting, Southern Gas Association..... 232
EDITORIALS—
Sixth Annual Meeting, Pennsylvania Gas Association—[Special Editorial Correspondence] 232
Panama-Pacific International Exposition's System of Heating and Lighting by Gas. Scientific Scheme of Piping for High Pressure Distribution Described in Detail, by Mr. Guy R. Kinsley..... 233
Current Mention..... 233
*A Small Oven Unit, Koppers Type..... 236
NEW METHODS AND APPLIANCES..... 237
Criticizing the Term Flameless Combustion—*Pump for Feeding Boiler Compound to Feed Water—*An English Clinkering Machine.
Recent Patent Issues..... 238
ITEMS OF INTEREST FROM VARIOUS LOCALITIES 238
Personal—Annual Meeting, Cohoes, N. Y.—Annual Meeting, Public Service Gas Company, N. J.—Contracts for the Gas Machinery Company—The Phoenix (N. Y.) Company Checked—More Financing, the Pacific Gas and Electric Co.—Mr. Kingsbury's Business Career—Changes at Jennings, La.—Good-by to the Jewell (Ia.) Mixed System—Inspection Proposed for Louisville, Ky.—Again, Cordele (Ga.) Agitates for a Gas Plant—Tenders for Lighting Department Supplies, Holyoke, Mass.—Meeting of the Blackstone Valley Employees' Club—Going into Gas Rates, Hudson, Marlboro, and Westboro, Mass.—Mr. H Tower Resigns—Something from Ottumwa, Ia.—And Other Items.
UTILITIES COMMISSION NEWS 240
Georgia Commission to be Liberal—Need Not Extend if Not Profitable—Rate Investigations in the Twin Cities—To Have Full Information Available—Bond Issues Lost by Tie Vote.
The Market for Gas Securities..... 240
Public Lighting Table for April, 1914.....(Advertising Section)... 10
Meeting Times of the Various Gas Associations " 27

[Prepared for the JOURNAL.]

Gas Investigations of the Bureau of Standards.[1]

[By MR. R. S. MCBRIDE, Associate Chemist, Bureau of Standards.]

It is a pleasure to comply with the request of the Editor of this JOURNAL for a review of the work of the Bureau of Standards on those problems which are of interest to the gas engineer. It is appreciated that it is only possible to get results of value to the industry and of service to the public, if the investigations are carried out properly, and to plan the work to this end the suggestions and criticisms of those active in the engineering field are of great value. It is hoped that a review of this sort will bring to the Bureau many helpful comments.

It is not necessary to go at length into the history of the work now being done at the Bureau in the line of standards for gas service, and standard gas testing methods, since most of the readers of the JOURNAL are, no doubt, already more or less familiar with Circular No. 32, and with the work which led up to the preparation of Circular 48, "Standard Methods of Gas Testing," the latter now in press. However, it may be well to summarize these with the other phases of the work, in order to show the present status of each of the major branches of it. For convenience of discussion, the problems may be grouped under the following subjects:

1. Specifications for Gas Quality or Service.
2. Gas Testing Methods.
3. Problems of Gas Manufacture and Distribution.
4. Utilization of Gas.
5. Properties of Gas.

Service Specifications.—As long as there are a large number of States and cities engaged in regulating the quality of service rendered to the gas customers within their respective limits, there will be great differences both in the form and substance of the regulations adopted; and, even if all the gas companies of the United States were under the control of a single regulating authority (a condition not at all probable even for the future) many differences in the regulations would necessarily remain in order to adapt the specifications to local needs. Nevertheless, there are many fundamental principles uniformly applicable through the country; and in any case the consideration of what has been done elsewhere is a helpful preliminary to the adoption of rules applicable to a given locality.

Following out this idea, the Bureau undertook a compilation of all of the rules and laws in force under city or State authorities, and has endeavored to study, not only the regulations themselves, but also the general results of enforcement, in so far as these results could be learned by correspondence or conferences. The information thus collected formed the basis of the discussion and recommendations of Circular No. 32, on "Standard Regulations for Manufactured Gas and Gas Service."

In these investigations the Bureau has endeavored to define the principles which should be the basis of a gas service specification, in order that the local authorities might have conveniently available the net result of the experience of all. And since the circular was prepared with the co-operation of a considerable number of engineers, experienced in the manufacture and distribution of gas, as well as those correspondingly active in State or city work, it became an expression of the best opinion of the industry.

Based as it is upon current opinion and practice, the circular requires frequent revision. The second edition is already exhausted and a third is now in preparation. In each edition it is the aim to correct and improve the circular, and to this end suggestions from those interested and experienced in the gas business are always welcomed.

In the utilization of the suggestions of the circular by States and cities, the Bureau has been asked to give assistance by sending a representative to attend conferences preliminary to the adoption of rules, or by rendering a report on the proposed regulations. In this work, of course, suggestions from the Bureau are purely advisory, and the companies are always left, as they should be, in direct relation with the local authorities. Furthermore, the Bureau has endeavored always to make it clear that such suggestions and reports as may come from it are made for the companies as well as for the officials; and in many cases the reports are transmitted to the company at the same time as to the city or State authorities.

Gas Testing Methods.—In the enforcement of regulations, as to quality of gas or gas service, the testing methods must be correct, otherwise friction or serious controversy will sooner or later result. Many examples could be cited where the failure of an inspector to fully understand his testing methods has resulted in such unfortunate incidents. It is clearly desirable, therefore, to have methods applicable in American practice which can be taken as standard; and the

1. Published with the permission of the Director, Bureau of Standards.

formulation of the operating directions for such procedures has been an important part of the work of the Bureau. In many cases extended researches have been needed before recommendations could be made, and it is only recently that these have been collected in the form of a single publication which will be known as Circular 48, entitled "Standard Methods of Gas Testing." This circular will be reviewed in greater detail in the near future. Suffice to say here that it covers the question of methods suitable for the determination of heating value, candle power, and purity of gas (hydrogen sulphide, sulphur and ammonia), the taking of pressure records and the testing of gas service meters.

The methods recommended are in most cases already used in some laboratories, either exactly or in similar form, but in many cases important precautions are emphasized, which are too often overlooked. To follow the correct procedure is rarely difficult, and almost never seriously time-consuming; to use a less exact method is, therefore, unnecessary and often inexcusable.

As the work of the Bureau in this line is continued, it is proposed to establish what might be termed a laboratory inspection service. This service would consist in an inspection of the apparatus and methods in use in any laboratory, to be made by a representative of the Bureau on request; the object being to discover any irregularities in the apparatus or methods employed, and to assist the inspector in charge of the laboratory to correct or eliminate conditions that might lead to incorrect results. In a few cases work of this sort has already been done, not only for the city and State officials, but also in company laboratories. The outcome has been very satisfactory in each case. Where errors were discovered they were eliminated; where no irregularities were noted there was added confidence in the results and satisfaction in the fact. In one or two cases it has been possible to point out the causes of discrepancies previously noted between tests made by the company and those made by the inspector. Causes of friction have thus been removed.

One advantage to the Bureau in this inspection service is the familiarity it gives with field conditions, and testing methods recommended will in consequence more likely be practicable and suited to the routine inspection and the works' laboratory.

The proper interpretation of results obtained in the testing of gas is not always easy, even when the methods of testing are known to have been accurate. It is hoped that the discussions of such problems, which are included in the circulars on testings methods and standard regulations, will assist in this interpretation.

Gas Engineering Problems.—It is not necessary for the Bureau to go into a detailed study of all the problems of gas engineering, but some consideration must be given to them, in order that the rules proposed and the testing methods recommended may be of a practical nature and applicable under existing conditions. It has, therefore, been necessary to give careful attention to the difficulties commonly met in manufacture and distribution, and their effects on the service or the gas quality, and the means taken to prevent and overcome these troubles. As more information of this sort becomes available to the Bureau, the value of the work done is certain to increase.

As examples of the questions on which there is need of a large amount of work, and to which time will be given as opportunity offers, the following may be cited: What is the effect of different methods of handling, and of different conditions in the works and in distribution, upon the quality of the gas; for example, distribution losses, condensation losses, etc.?

What is the limiting and what the most desirable quality (from standpoint of engineering efficiency) of gas under the different conditions to be met—of kind of coal or oil, of character of process, of local weather and other conditions?

Such questions as these can never be considered as finally settled, for most of them are affected by every important development of the industry. However, their careful consideration cannot fail to give some results of value.

It has also been frequently suggested that the Bureau take up the question of collecting and collating gas engineering data of importance to regulating and operating officials. This has not yet seemed practicable, but it is certain that such a collection would be very useful in showing what is standard practice and what variations are likely to be met under special conditions. Each company could then by comparison more readily determine in what particular it could expect to make improvements. Such data should be presented in the form of summaries, which would not subject the individual company to unfair comparisons.

Utilization of Gas.—The work which has been done by the American Gas Institute and the National Commercial Gas Association upon gas consuming appliances has almost wholly dealt with specifications as to the quality of material entering into their construction or with the form of appliance from the standpoint of efficiency or durability. This has left two important phases of the subject which have been taken up only at intervals, generally by some particular gas supply or gas appliance companies: (1) The question as to the proper installation of the appliance from the standpoint of safety from fire and asphyxiation (either due to leakage or to improper combustion); and (2), the question as to the relative usefulness of gases of different kinds or of different heating values. The effect of changing conditions of gas supply upon the efficiency or safety of an appliance must also be considered. Changes of gas pressure, gas density, or the relative amount of air required for combustion, are important factors, and very little work has been done to determine the magnitude of their effect.

None of these investigations has been actively taken up by the Bureau, but it is hoped that, as information of importance bearing on these questions becomes available, it can be collected and prepared in a form which will be of value to the company and consumer. The importance of these considerations, as affecting the choice of regulations for service, will be clear to everyone; the necessity for the Bureau to give some consideration to the problems is, therefore, apparent.

Properties of Gas and Gas Analysis.—The preparation, free from impurities, of all of the constituent gases of ordinary manufactured gas, has been undertaken by the Bureau in order that the properties of these gases may be more exactly determined. It is expected that the heat of combustion, specific heat, density, refractive index, solubility and other important chemical and physical constants will be determined.

After these constituent gases are available it will be possible to make up known mixtures of them, and work by gas analysis methods commonly used can then be carried out in ways not previously done. This is of importance because of the commercial applications of gas analysis as well as its scientific interest.

At the present time there are no methods for the exact separation of the various unsaturated hydrocarbon gases commonly called "illuminants." These are the most important of the heat-giving and illuminating constituents of commercial gas, and yet we have no means of separating the several groups of gases thus classed together, much less the individuals of each group. Preparation and testing of mixtures containing known quantities of these compounds will throw much light upon the subject and perhaps will make it possible to devise analytical methods for their determination.

The commercial types of gas analytical apparatus are generally only simplified forms of the more accurate types of equipment, accordingly the investigation of the exact methods will show what changes, if any, are needed in the ordinary types.

Special gas analytical methods are needed from time-to-time; for example, methods for quick and accurate determination of the carbon monoxide content of air in appliance testing, the determination of carbon dioxide in air for ventilation tests, or special analysis of gases evolved in various processes Some of these require special investigation, others can be adapted from the methods applicable to illuminating gas.

Reactions and Properties of Gas Mixtures.—As soon as gases of known compostion are obtainable, either by mixing pure gases in the desired proportions, or by analyzing to accurately determine the character and amount of the hydrocarbons, it will be possible to carry out tests which will show the effect of temperature and pressure, as well as mechanical treatment and friction of flow, on the composition of commercial gases. Means of elimination of the large distribution losses may then be obtainable, but more than commercial tests on this problem are needed, since the vapor pressure relations are complicated by the solubility of the gases both in gases and in the condensed portions of the original mixtures. The changes of "vapor pressure of a liquid" with change of the gas over it may be sufficient to be of appreciable effect.

The relation of heating value to composition, or density to composition, will be apparent when the constants of each gas constituent are known; but the open flame and mantle candle power must be determined separately for each mixture studied, since these properties are not additive. The relation of heating value, comburiverous power and density to gas candle power in both open flames and mantles can then be deduced.

Gas reactions of various sorts are of great manufacturing interest,

and with a supply of pure gases they can be studied. The thermal decompositions and interactions of the hydrocarbon gases have been little studied, but facilities should be available permitting work to be done in this line.

Heating Value Standards.—The heating value of a gas is the most important gauge of the quality for domestic or industrial use, and hence this property is rapidly becoming the basis for the fundamental specification of quality. To fix it at the proper value is important, for too high a requirement gives rise to unduly expensive gas, while too low a figure permits qualities which, though cheaper in cost per 1,000 cubic feet, are really more expensive in giving less heat per dollar of cost to the user. To fix the proper intermediate value, or range of proper values, is not an easy task; but the rational method to apply in the estimates of this value can be clearly defined. The Bureau has undertaken an investigation of this problem, with the idea of clearing up some of the uncertainties which now exist. This study will be directed toward the establishment of certain principles which should guide an engineer in his estimates on this subject; but we shall not, of course, attempt to lay down any rule which could be followed in every case, much less any formula in which the several factors could be entered and a calculation performed to give the desired result. The advantages which may result from a full consideration of the subject, and from the use of the method by others in actual practice, are the following:

1. The basis of heating value regulations should be made clear.
2. Regulations would be based on technical considerations, not the arbitrary opinion of any person or body of persons.
3. The customer would get his service on the most economical basis; that is, the company would have a proper return upon its investment at the least expense to the public.
4. A company would have well defined means of showing whether changes of standards were required.

These advantages show that the standard could be made fair and equitable, and sound, both from economic and engineering viewpoints.

Completed Researches.—In the above discussion many of the plans for the future have been suggested, as well as outlines of present work given. As a brief statement of some of the investigational work which has been completed, we may give the following list of publications of the Bureau already issued or now in press:

"Industrial Gas Calorimeter" (Technical Paper, No. 3; in press).
"Determination of Sulphur in Illuminating Gas" (T. P., 20).
"Determination of Ammonia in Illuminating Gas" (T. P., 34, in press).
"The Pentane Lamp as a Working Standard" (Scientific Paper), 216.
"Standard Methods of Gas Testing" (Circular 48, in press).
"Standard Regulations for Manufactured Gas and Gas Service" (Circular 32, out of-print. New edition in preparation).
"Legal Specifications for Illuminating Gas" (T. P., 14, out-of-print, superseded by Circular 32, 2nd edition).

These reports, and those on other investigations which do not have to do with the gas itself, but are of interest to gas engineers, may be had on request. A complete summary of them is given in the list of publications of the Bureau (Circular 24).

CONCLUSION.

In carrying out these investigations the Bureau has striven only to serve as a clearing house for information and as a co-ordinating agency with reference to the many sources of opinion and information among the companies and the various States and cities. The Bureau is entirely without authority or desire to act as a regulating agency; it will continue to serve only as a medium of exchange for technical information and will consider local problems only in an advisory capacity. The work of the Bureau should be of great assistance also to consulting engineers by tending to make their work more satisfactory, and to increase the demand for the services of well qualified engineers.

In the work outlined above progress will, of course, be slow, partly because of the magnitude and difficulty of the problems, partly because of the limited resources of the Bureau. If the cordial co operation of city, State and company officials is accorded the Bureau, in the future as in the past, substantial progress will, however, be made in the study of these problems.

[Official Report.—Continued from Page 218.]

FORTY-FOURTH MEETING, NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

First Day—Morning Session.

The President called on Mr. H. C. Crafts (Pittsfield, Mass.) who read the following paper on

INTENSIFYING OUTPUT.

To those of us who live in rural and agricultural districts, there has come within the past few years the expression "Intensive Farming," a term which is self-explanatory, meaning simply the cultivation of the land on a more intensive scale than heretofore, making a given acreage yield a greater return than it previously yielded.

This comparatively new term suggests a like expression which might, perhaps, with profit be applied to our own business: Namely, "Intensifying Output." meaning thereby the adoption of such methods as would increase the quantity of gas flowing through an existing distribution system of mains, services and meters, with a resultant increase in output per meter and output per mile of main.

Perhaps no other phase of the gas business of to day that has, or at least should have, such general interest to every department as that of output. With no output there would be no gas company; with a small output there is, of necessity, a relatively high rate and limited return, while with increased output there comes the possibility of decreased costs in manufacture, distribution, and overhead charges. And this is especially true if the increase in output can be made without a corresponding increase in plant equipment.

With the rapid increase in cost that has come in the generation of our product within the last 2 or 3 years, in oil, coal, and labor, we are confronted with a higher cost of gas in the holder, together with increased overhead charges for taxes and insurance, and, frequently, with somewhat insistent demands, on the part of the consumer, for lower prices. This condition may well cause us serious reflection, and suggests the possibility that it may be met, to some extent at least, by aggressive and determined, yet rational, methods for increasing output. This is especially true of many of the smaller and medium-sized companies where a comprehensive plan for development among present consumers should give a considerable increase in revenue, entirely out of proportion to the small additional investment that would be required in most cases.

It is self-evident that a consumer, using gas for cooking alone, will become a more profitable consumer if he can be induced to use gas for light as well, or if a gas water heater or gas heating stove can be added to his gas burning equipment. It is also evident that the profit on the additional gas thus sold will be larger than upon that portion which he has been using, because no additional investment or overhead charges will be required, and the expense of caring for the consumer, the reading of meters, bookkeeping, and collecting will not be increased. For the same reason it is also self-evident that one consumer, with one meter using gas for lighting and cooking, is more profitable to a company than are two consumers who require two meters, the one perhaps using gas for lighting only, the other for cooking only.

If we admit the fundamental idea that it is advantageous to a company to increase the consumption of its present consumers, we come naturally to the question, "How shall it be done?" It is not my intention to attempt to answer this question in detail, by taking up in succession the various appliances that can be installed for increasing the use of gas; but rather to suggest certain fundamental truths which are applicable in general to practically every company.

In these days of multiplying uses for gas, we may well ask ourselves, first of all, the question, "Are we giving sufficient attention to the original and primary use for gas; namely, gas lighting?"

There seems to be a feeling on the part of some gas managements that the days of lighting by gas are about over; that it is to be supplanted by electric lighting, and that the development of their companies can best be accomplished by devoting their undivided energies towards selling gas for what may perhaps be called secondary uses, giving little thought to active promotion work in the lighting field where there is real competition.

The two principal sources of revenue for an electric company are power and light. The first can be sold to relatively few of their customers, and it is perhaps only natural that electric companies should show greater energy and care in developing their lighting business. The simple fact that we have competition in this particular field, however, should not cause us to relinquish it; but rather to study the

situation and adopt such methods of installation and maintenance of gas lighting equipment as will make the use of gas for lighing attractive and satisfactory to the consumer.

There are as yet but few companies that are giving really good service to their customers in the matter of maintenance, especially in house lighting, and, with a determined effort for installing modern and satisfactory burners, there must come, if we are to hold and increase this part of our business, an effective and thorough system of inspection and maintenance. Such a system, combined with the actual advantage of cost per unit of light, should enable us to continue to receive a substantial proportion of our revenue from the lighting business and thus help materially in "intensifying output." This part of the business is too important to be neglected or to be carelessly allowed to slip away. Competition in lighting is nothing new; it is simply somewhat more aggressive than it formerly was, and this should mean additional aggressiveness on our part. In the old days of the open flame burner we had the kerosene light for a competitor and, with high prices for gas and inefficient burners, a large amount of lighting was done with oil lamps, in fact, the proportion of the total lighting in any town that was done by the gas companies was probably less than it is to-day.

With the advent of the eletric light, the business of the gas companies seemed destined to suffer severe loss, but as we look back now at those days, we realize that we were just entering an era of expansion and development such as the industry had never known and which has continued to the present time. With every improvement and economy in electric lighting there has seemed to be a corresponding betterment in gas equipment, and, with promise of still more efficient burners, we should not forget that we were in the lighting business first, and that there is no reason (as yet) why we should meekly retire from the field.

The new electric nitrogen lamp has been heralded for some months and, with an estimated decrease in current consumption of 50 per cent., has naturally attracted much attention; but the facts seem to be that this saving will be possible only in lamps of high candle power. The following extract, from the editorial colums of the *Scientific American*, dated Jan. 3, 1914, would seem an unbiased statement of the results that may be expected: "Probably the most promising electrical event of the year is the development of the nitrogen lamp. This is a tungsten lamp filled with nitrogen gas, in which the filament may be heated to a much higher temperature. In the large units of 4,000 candle power and over it shows an efficiency of 0.4 to 0.5 watt per candle power. Lamps for the standard 110-volt circuit will produce 1,000-candle power and over 0.5 watt per candle. It is found difficult to produce nitrogen lamps in smaller units, owing to the cooling effects of convection currents in the gas."

It would seem from the above extract, therefore, that, at the present time, the only economy that may be expected from the nitrogen lamp is in large units, a field in which gas lighting has never been particularly active.

When we begin to consider the secondary uses of gas, we find that we have less competition, and that the various appliances, gas ranges, water heaters, gas irons, heating stoves, hotel and industrial equipments, offer a wide and varied opportunity for expansion and development.

The majority of companies have been more diligent in the sale of gas ranges than in that of any other appliance and have installed large numbers; but they have been less active and progressive in the installation of its corollary, the gas water heater. The gas range is attempting to invade the field of the coal range, and has to a considerable extent, but the average coal range has one decided advantage that the gas range does not have: Namely, that it will supply hot water for domestic use. The gas range will continue to be used as an auxiliary to the coal range until some provision is made for supplying hot water. There are a variety of ways in which this may be done, but the installation of a copper-coil water heater as an auxiliary to the gas range will, in many cases, meet this want, and will provide for the consumer a convenient, satisfactory method of heating water, and for the gas company additional output of gas for consumption, both in the gas range and water heater.

For a variety of reasons, the installation of gas water heaters has progressed very slowly, and, from an estimate made from various sources, it seems probable that, taking New England as a whole, there is at the present time an average installation of about 1 gas water heater to every 14 meters in use, while in only 2 or 3 cities does this proportion exceed 1 heater for every 10 meters.

This matter was brought forcibly to our attention in Pittsfield something over 2 years ago, when an analysis of our gas consuming installations, as of January 1, 1912, showed the following:

Meters in use	6,967
Gas ranges in use	5,412
Gas water heaters in use	538

These figures were suggestive—an average of approximately one range to every 1¼ meters in use, but an average of only 1 water heater to every 13 meters in use. In other words, 78 per cent. of all meters, including those in stores, offices and factories, had a gas range attached thereto, while less than 8 per cent. had a gas water heater connected.

The condition which we found at Pittsfield is not an unusual one, indeed it exists very generally throughout the country: Namely, that the proportion of gas water heaters in use to gas ranges in use is very small. The field of water heating offers a splendid opportunity under average conditions for increasing gas sales, and especially for "intensifying output."

There is not, on the part of the consumer, a clear understanding of the convenience and utility of the gas water heater, and the majority of gas range users are getting their hot water in some kind of a crude way, neither convenient to them nor advantageous to the gas company. The usual sale methods in this particular line seemed to be inadequate and to result in a slow and unsatisfactory development, so we decided to make a radical change in our general practice of installing water heaters.

This new method, which we termed a rental-purchase plan, provided simply for the rental of a copper-coil, tank water heater, at $3 per year, payable in advance, the title of the heater to pass to the consumer when 5 payments or a total of $15 had been made.

We made this a special campaign proposition and confined its operation to the mid-winter months, when our jobbing department had but little work, and by this means not only increased our gas burning equipment, but kept our regular fitters constantly employed. During the balance of the year, we sold the heaters upon the same basis as any other appliance, the cash price in 1912 being $15, in 1913, $18.

During the winters of 1912 and 1913, we took orders for and installed 1,131 water heaters upon this rental-purchase basis, and, in addition, we sold outright during these 2 years 341 heaters. Our report for January 1, 1914, shows the following:

Meters in use	8,641
Gas water heaters in use	1,963

This is an average of more than 1 water heater to every 4½ meters in use, or about 22 per cent. against 1 heater for every 13 meters, or 8 per cent. on January 1, 1912.

We have charged to our "Water-Heater-Rental Account" every item of expense incidental to the proposition including installation, bookkeeping, advertising, and soliciting, and have credited to the same the payments made on accounts. The 1912 heaters stand upon our books to-day at $8.57 each, against which there should be ultimate credits of $9, and our 1913 heaters are carried at $11.47 each, with $12 to be paid.

The consumption of gas has been increased and, from a careful analysis of the accounts of these consumers who installed water heaters, it is found that the average increase has been 8,279 cubic feet per meter per year. The heaters have proved satisfactory to the consumers and, during the two years that this plan has been in force, we have removed, for all causes, 33 heaters out of a total of 1,131 heaters, and have had no trouble in again placing the heaters thus removed. Payments have been made promptly and with little trouble and expense for collection. The second year payments of $3 became due on 652 heaters during the year 1913, and only 4 of these (or a total of $12) remain unpaid.

While the installation of ranges and water heaters perhaps offers the largest possibilities per unit for increasing gas output among house consumers, we should not neglect the other appliances, that offer undeveloped possibilities, which will all contribute their proportion towards increased sales.

The sale of hotel, restaurant and industrial equipment requires special study and individual treatment, so in a paper of this length it can only be suggested that it offers splendid opportunity for the development of large outputs per meter, and that the return from this type of installation will materially help to intensify output.

As to methods in general for the introduction of gas consuming appliances, we all have our own ideas, and have adopted them with varying results; advertising, circularizing and letter-writing are

helpful and contributory, as is a card record of building permits and another of available prospects, among the houses already occupied. I believe, however, that the one method which brings the surest results is personal solicitation from house-to-house.

The so-called campaigns that have been conducted within the past 2 or 3 years, are along this line, and while they may have not been uniformly successful, the net result has been satisfactory as a whole. These campaigns have demonstrated that a large number of gas consuming devices can be distributed in any city or town by a house to-house soliciting force, working systematically for the sale of one definite article.

Experience would seem to suggest certain modifications in the conduct of these campaigns. The employment of a temporary force of men, hired for a short time only, is not usually satisfactory. These men know but little about gas appliances; their main thought or endeavor is to secure a commission on the goods sold. They know that their time with the company is short, and they are tempted to exaggerate and make false representations to consumers, in order to secure as large a financial return to themselves as possible. The results which follow such methods are not conducive to the upbuilding of confidence in the company. Experience would seem to suggest a smaller number of regular men, giving their entire time to continuous campaign work, and covering a city perhaps three or four times per year, each time with a special campaign proposition which they shall work exclusively.

It would also seem advisable, when selling upon the installment plan, to require that an initial payment be made at the time the appliance is delivered or installed. This suggestion is made for two reasons:

First: To prevent an appliance being installed by a solicitor upon a supposedly free trial basis, the required payment of even a small sum making such misrepresentation difficult.

Second: To facilitate subsequent collection of the remaining installments.

The permanent men engaged for this special campaign work will not replace the regular outside solicitors which every company should have. These men should be something more than mere solicitors; they should be real representatives of the company, with the interests of the organization at heart and a thorough knowledge of the appliance and service end of the bnsiness. In their intercourse with the public and our consumers, they can make themselves very valuable, and I believe the best possible men should be secured for this representative work, and that their salaries should be commensurate with the work they are expected to do.

I have intended primarily to suggest the necessity and importance of developing more intensely the field which we are now occupying with our present street main systems; but it is also necessary for any company, that is doing its full duty to the community which it serves, to increase and add to its length of mains from time to time. This should only be done upon the same intensive scale and in those districts where prospective customers are willing to cooperate by installing gas lighting and other appliances to such an extent that the proposed extension will pay a fair return upon the investment.

In conclusion may I suggest that this paper is intended to be somewhat general in character; that the writer has a full realization of the fact that conditions vary in different localities; that methods which are adaptable to the larger cities are not necessarily adaptable to smaller cities or towns; that certain classes of population have their special uses for gas; and that in every community there are certain local conditions to be contended with.

I believe, however, we are too prone to say that, while it may be feasible to adopt certain methods in another town, our own particular community is different and it cannot be done. We should remember that the gas business is a great and growing industry; that the uses for its product are constantly increasing; that there are many fields for its use which are not yet covered; that every city has peculiar and special uses which can and should be developed; and that every locality (be it rich or poor, manufacturing or residential, city or country) has its people who need and want gas for more uses than they themselves know. The prosperity, stability and growth of the gas business are dependent to a considerable extent upon the increased sale of its product, and upon definite methods for "Intensifying Output."

Discussion.

The President—I hope you will ply Mr. Crafts with questions on his very interesting paper.

Mr. C. A. Learned—In making a partial canvas of Meriden we were greatly surprised to find that not one-third of the houses had hot water boilers. So the proposition of a water heater is not the same as that of a gas range. Such being the fact, we have to find some means of installing a water boiler in the house, and connect it with a water heater or have both in one. We installed in Meriden in 1913 about 325 water heaters; we had previous to 1913, 400. We are starting to-day on the kind of a campaign Mr. Crafts speaks of, a $15 campaign, $1 off for cash. It will be rather interesting to know how we came out. Terms are $3 with the order and $4 each year for 3 years. In 1 month's time our price advanced to $18, like Mr. Crafts.

The President—Mr. Barnum, have you anything you wish to say?

Mr. Barnum—I think Mr. Crafts strikes at one of the most prolific fields for increasing our output. The water heater is an exceptionally satisfactory article to sell, as it can be properly connected with very few complaints from it, and people seem to appreciate it more than any other gas appliance. I must compliment him on the statement that only $12 remains unpaid on 652 heaters. That shows exceptionally good organization. I agree with him in regard to the campaigns conducted by temporary men brought in to represent (or misrepresent generally) gas companies in getting out lamps or irons, with the sole object of getting them out. From what little experience I have had, there are always misrepresentations and a great many complaints. Fewer men permanently employed seem to give more lasting benefit. You often hear the statement that a method would do in one town and not in another. We in New England cannot say that, New England towns are so much alike. A method successful in one town, properly worked, will succeed in every other town. In Worcester we have experienced serious competition from electric lighting, and in stores we have managed to hold a good deal of lighting by selling lamps where they have electric lights, on the argument that they ought never to be without gas, that for safety they should have some gas lamps. During the cold weather we have used the argument of heat from the lamps. We have given a great deal of attention to gas for industrial purposes, as the industries are greatly diversified. Here are a few of the things that we are successful in using gas. The Costes' Clipper Company, which is widely advertised, uses a great deal of gas in tempering parts. The concern makes other things than clippers, in fact, 80 per cent. of the crankshafts of automobiles made in the United States are mads in Worcester. Those are all heated and treated in gas furnaces. A large amount of grinding material, wheels principally, is made in Worcester, I think ½ of all that is used in the United States, and one concern has 6 ovens using gas for baking wheels. A great many wire goods of various kinds are made in Worcester, and these are either sherarized or japanned in gas ovens. We have recently been successful in getting the American Steel and Wire Company, which have two large plants in Worcester, employing about 7,000 men. Each plant has its own gas plant, but they have decided to shut down the plants and use our gas, and they say at the start they wish one million feet a month. I should like to hear if anybody has had any experience with the Rector house heating system.

The President—I do not wish to stifle any discussion or any matter to be brought up in this connection, but to save time I will assume that a vote of thanks is extended to Mr. Crafts for his paper.

CALLING on MR. GARTLEY TO SPEAK.

The President—We have with us to-day a gentleman whom you very well know, Mr. W. H. Gartley, President of the American Gas Institute, who wishes to speak for about 3 minutes on the coming Gas Congress.

Mr. W. H. Gartley—Gentlemen, in assuming the duties of the Presidency of the American Gas Institute this year I was somewhat astonished to find that I had also had thrown on me the Chairmanship of the Gas Congress Committee. That committee, as you know, is made up of representatives from the two national associations, the district associations and a number of State associations. As this Association is the district association representing the largest number of consumers, and is the third, after the two nationals, in representation of numbers of consumers, I think it very important that I should talk to you for a moment about the gas congress, because there has been very little said in print about it and we need your co-operation. You remember that Mr. E. C. Jones, of San Francisco, came to the Atlantic City Convention of the Institute (1912), and, as the representative of the President of the Panama-Pacific Exposition, and as the accredited representative of the Pacific Coast Association, invited the American Gas Institute to agree to meet at San Francisco in 1915, and to take under their auspices the conduct of an International Gas

Congress. A representative was also sent from the Pacific Coast Association to the National Commercial Gas Association, inviting them to hold their convention there. But the question of who was to have charge of that congress in the beginning was decided by putting the American Gas Institute in that capacity. There has been a representative of the National Commercial Association appointed on the committee, I told the President of the National Commercial Association that if he cared to we would be very glad, I thought, to have him have an many representatives on the committee as the Institute, but he said he thought it was not worth while, that there was such a community of interest and no strain that he thought the committee large enough. Now the question is what constitutes an international gas congress. There has been no international gas congress ever held in the United States. The gas congress at St. Louis was national, not international. The last international gas congress was held in Paris, in 1900. Therefore, the criteria from which we are to determine what shall constitute a gas congress are natually limited. We find that, in the Paris Exposition, a number of the foreign societies were represented, and at the sessions of the congress first one and then another of the presidents of these various foreign societies, and some of the prominent local societies, were asked to preside; and papers were read in a limited number. Well, I think some 22 papers were prepared. Now, we can do what we want, of course. It has been decided by the committee that the congress will be held the week beginning September (I think) the 27th. You can confirm that. It is the week after the large engineering convention, made up of the American Society of Mechanical Engineers, the American Society of Mining Engineers, Civil Engineers, and Naval Architects. There will be, of course, several conventions held by the electrical men. We propose to have the gas congress hold its sessions only in the morning. That will permit the Institute and the other societies there to hold their sessions in the afternoon. Now the question comes up, shall there be an exhibit? If so, of what shall that exhibit consist? It has been decided that an exhibit will be of interest; first, to the public at large. Such exhibit it was thought should be one that was striking. You don't want to show these people a lot of gas appliances representing each manufacturer making the same thing, because in a place like a world's fair the things must be bulky, must strike the eye. It was thought that perhaps we could get some lighting of the avenues. Then there will be an exhibit that should attract the attention of the gas men themselves who are visiting from all parts of the country; that should be an exhibit that would be made up by the appliance men, manufacfurers of apparatus, and such other paraphernalia as is used by gas people. We want to say, therefore, that we want your co-operation. We want to ask you, now that I have explained what the purposes are, to give us your ideas. Everything that is done must be done within the next 6 months. Those large things must not be put off until it is too late. You cannot get in. Space won't be allotted you. They won't listen to you. They will say, "We have gone too far, we cannot stop now. We have to finish this thing up in a certain time. Our plans are made, and we won't change." Therefore, if anybody has any ideas, if you want to make an exhibit, if you want the gas congress to be dignified and fully representative and fully satisfactory showing from the gas men, as opposed to such competitors as you have in your business, either in engineering or in lighting or heating, let us have your ideas now. On behalf of the committee on the international congress, I ask you to send anything that you have, any questions, any inquiries, any suggestions, to Mr. Ramsdell, the Secretary of the Institute, who is also the Secretary of this commission. Thank you very much, Mr. President and gentlemen.

The President—I can assure Mr. Gartley of the hearty co-operation of this Association. We will have a representative there, and I am sure you will see him in a front seat.

Mr. Gartley—Gentlemen, of course, your past-President, Mr. Nettleton, is already a representative on this commission, and I don't need to say you are worthily represented.

Mr. Barnum submitted this

RAPORT FROM THE COMMITTEE ON NOMINATIONS.

Your Committee reports that it wishes to put in nomination the following candidates for officers of this Association during the ensuing year:

For President.—C. A. Learned.
For Vice-Presidents.—H. K. Morrison and H. C. Crafts.
For Directors.—J. F. Wing, J. A. Norcross, A. M. Barnes, Carrol Miller, A. B. Tenney.
For Treasurer-Secretary.—N. W. Gifford.

The President—You have heard the nominations. How shall we proceed?

ELECTION OF OFFICERS.

On motion of Mr. Africa the Secretary was instructed to cast the ballot of the Association in favor of the election of the gentlemen proposed by the Nominating Committee. The Secretary subsequently reported that the instruction had been followed.

The President called fer

RESPONSES FROM THE OFFICERS ELECT,

and President-elect Learned said:

Mr. President and Gentlemen—I tried yesterday to induce our present President to hold over another year, but I was unsuccessful. I thank you for the honor conferred upon me, and trust I may be a worthy successor to the many notable gentlemen who have been Presidents of this Association.

The President announced a recess, to terminate at 2:30 P.M.

(To be Continued.)

[Continued from page 220.]

The Installation of Cast Iron Mains.[1]

[Prepared for the Eighth Annual Meeting, American Gas Institute, 1913, by WALTON FORSTALL.]

PHILADELPHIA'S SYSTEM OF RECORDS.

Organization.—There is a Superintendent of Records, reporting to the Engineer of Distribution, and under him a Chief Draftsman in direct charge of obtaining, mapping and filing records, through street clerks and draftsmen. A street clerk is usually a graduate of a technical institution, first put to work in the Records Division to familiarize himself with the system. After this inside apprenticeship, he is sent out to record the work of street main gangs, and is in position to learn the details of street work, and qualify as a foreman of main or service work. The position of street clerk serving as a traing school for foremen, superintendents and managers, and allows the gang foreman to devote his entire time to directing his men.

The draftsmen in the office, post upon the main charts the records made by the street clerks, and furnish reports needed in connection with main work.

Each street clerk is provided with the following equipment:

1 45°, 6″ angle,
1 60°, 4″ angle,
1 Brass plumb bob,
1 Note book, 3¼″ x 6″, 100 leaves,
1 Sketch book, 4½″ x 7½″, 60 leaves,
1 Piece of yellow chalk,
Clips and fasteners of various kinds,
1 Chalking cord,
1 Band dater,
1 Street directory,
1 Ink eradicator,
1 Combination ink and pencil eraser,
1 Draftsman's soft pencil eraser,
1 Holder for Daily Progress Report,
1 Black, blue, red, brown, green and yellow drawing ink,
1 Set of instructions to street clerks,
1 Set of drawing instruments,
2 Ink pads, red and black,
1 3-H pencil,
1 Medium pencil,
1 6′ rule,
1 Piece of soapstone,
1 Set of rubber stamps,
1 50′ metallic tape,
Pens, blotters and printed forms.

Field Records.—A field record is made of every opening. As all subsequent records depend upon the field sketch, Fig. 25, the measurements are carefully made and clearly plotted in every detail, using a 3-H pencil. Each sketch is indexed at the back of the field book, by street name, and when the book is full it is turned into the office where it is dated and numbered.

Fig. 26 shows, in a general way, the use of the tape line, measuring rule and plump bob. The tape line is drawn sufficiently taut to bring it to a straight line, but not stretched, and is protected as much as possible from the weather. If wet or soiled, it is dried before winding into case. Every two weeks each tape is tested for length against a steel tape. In using the plumb bob, three trials are made for each measurement taken.

Curb lines are used as basis of reference wherever possible, then building or fence lines, car tracks, etc. All measurements at right angles to a main or street axis (known as "ordinate" measurements), are measured to the center of the main from the outside of the near-

1. Slightly abridged.—EDS.

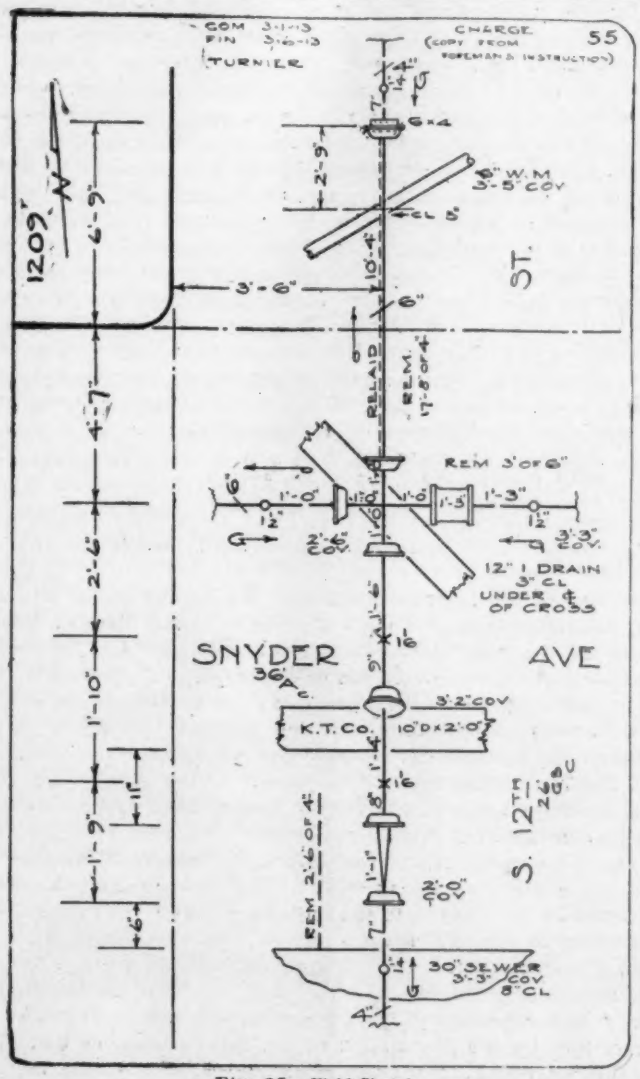
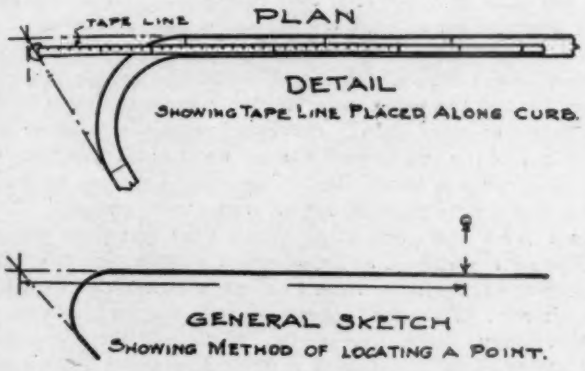


Fig. 25.—Field Sketch.



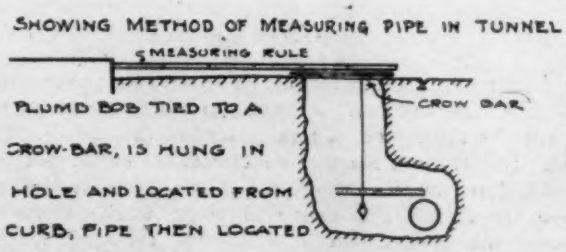

SHOWING METHOD OF MEASURING PIPE IN TUNNEL
MEASURING RULE
PLUMB BOB TIED TO A
CROW-BAR, IS HUNG IN
HOLE AND LOCATED FROM
CURB, PIPE THEN LOCATED
CROW BAR
FROM PLUMB LINE AND MEASUREMENT. ADDED FOR TOTAL

Fig. 26.—Measuring Equipment.

est curb, and are taken at all angle points in the line. Ordinate measurements of foreign structures are always taken with reference to the center of the nearest main, and are to the nearest edge of rectangular structures and to the center of circular structures.

All measurements parallel with a main or a street axis (known as "axial" measusements) are taken from the intersection of the curb serving as a base for the ordinate measurements, with the intersection, actual or produced, of the nearest curb of the intersecting street. Where streets intersect at other than right angles, measurements are taken as in Fig. 27. The intersection of the curb linss is obtained by

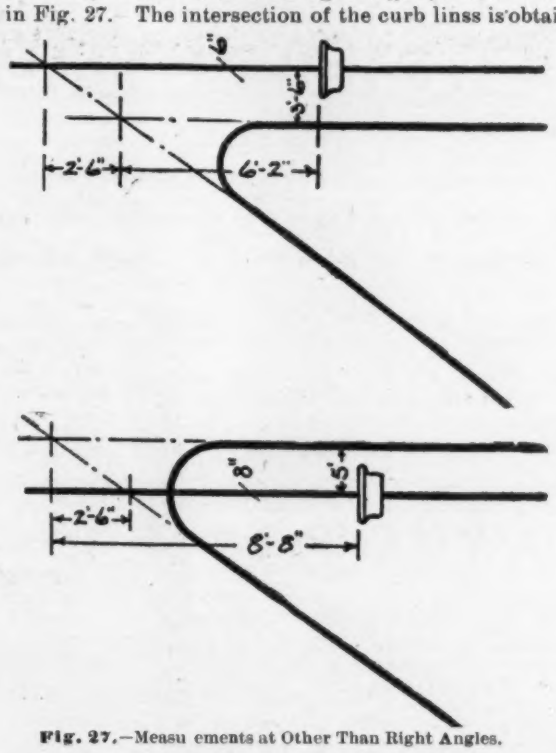


Fig. 27.—Measu ements at Other Than Right Angles.

the crossing of the two cords extended along and in line with the curbs, or by using a chalk line.

All depths are taken vertical from the top of the street surface to the top of the structure. Elevations are not shown in the field book unless the structures are quite complicated.

Axial measurements on branches are taken from the intersection of the axes to the face of the nearest bell in all 3 or 4 directions. Axial measurements on bends are taken for each angle point to the face of the nearest bell, along the axis of the bend. Axial measurements on Y's are taken from the intersection of the axes to the face of the nearest bell in all 3 directions. Bushings are taken as 1 inch long and caps as 4 inches.

Reports to Office.—Each day the street clerk makes a report in triplicate (Fig. 28), one for the district office, one for the Records Division and one for himself. The information called for in the lines opposite "Laid or Overhauled, Valve Drip Service, etc.," is indicated by drawing a line through the proper significant letter.

Permanent Records.—From the field book record a permanent "sketch record" is made on the form Fig. 29, whenever any pipe is laid, or old pipe uncovered. This form and Fig. 25 are quadrille ruled. If only a few feet of old straight pipe is uncovered and no foreign structures, the record is made on the form shown in Fig. 30.

Sketch Details.—In making the sketch record (Fig. 29) the following details are observed: Nothing is drawn to scale, but all of the structures are shown as they exist relatively to each other, avoiding crossing of figures with lines and the crowding of figures and lines.

The ruled lines on the card are used in every feasible way, and when possible, the centre lines for the mains, which are shown by lines 1/32" wide as follows:

*Pipe laid in new work	solid red.
Existing pipe uncovered	solid black.
Pipe abandoned	solid green.
Pipe removed	broken green.
Pipe relaid	solid red overlaid by broken black.
Water mains	solid blue.
Conduits	solid yellow.
Manholes, handholes, sewers, inlets and house drains	solid brown.

* When wrought iron pipe is used, this fact is stated.

A separate sketch is made where manholes enclose mains. If a foreign structure is being laid, but is not actually in place when the main record is taken, its approximate location is shown by a dashed line of appropriate color. Clearances are shown in red, and give the minimum distances between the main and foreign structures.

(*Continued on page* 234.)

THE AMERICAN GAS LIGHT JOURNAL INC.

Entered at the Post Office, New York City, as Second-Class Matter.

Published weekly at 42 Pine Street, New York City.

Telephone Call, John, 2996. Cable, Am-Gas.

E. P. CALLENDER, President.
A. M. CALLENDER, Vice-President and Treasurer.
CHARLES H. WADELTON, Secretary and Manager.

THOMAS J. CUNNINGHAM, SANFORD K. CAMPBELL, } Editors.

NEW YORK, MONDAY, APRIL 13, 1914.

[OFFICIAL NOTICE.]

Sixth Annual Meeting, Southern Gas Association.

SOUTHERN GAS ASSOCIATION,
OFFICE OF THE SECRETARY,
ATLANTA, GA., April 3, 1914.

To the Members of the Southern Gas Association: The sixth annual meeting of the Southern Gas Association will held at Mobile, Ala., April 22, 23 and 24, 1914. The following papers will be read and discussed:

"Public Utility Policy," by H. M. Moore.
"Construction and Operation of a Modern Gas Plant in a Small Town," by C. M. Crawford.
"Equitable Gas Rates," by S. E. DeFreese.
"Practical Gas Lighting," by E. M. Osbourne.
"The Industrial Position of Artificial Gas," by Mr. Lansley.

A paper, by Mr. Roehmer, of the Wisconsin State Commission on a subject not yet announced.

Respecting hotel information and entertainment programme, separate notification has been made.

There will be no reduction in railroad rates, except to those who buy railroad tickets at same station in Alabama. A 3 cent round-trip rate will prevail in Alabama, provided the round-trip ticket is purchased on April 19, 20 or 21. All gas men are welcome.

E. D. BREWER, Secretary.

[Special Editorial Correspondence.]

SIXTH ANNUAL MEETING, PENNSYLVANIA GAS ASSOCIATION.

HOTEL ALLEN, ALLENTOWN, PA., April 8, 1914.

Last night pretty close to 3 score shared in the "Informal Dutch Supper," which was acceptably served, in accordance with proper Dutch accompaniment, and absorbed after precise Dutch consideration. The affair took up 2 hours that were of a certainty pleasantly spent. This morning was typical of April days, and mayhap languor was responsible for the seeming slowness with which the delegates assembled. Whether so or not the tardiness accentuated the fact that it is not altogether good practice to have headquarters and sessions' room under different roofs, no matter how close the location. Not that, taking these separately (headquarters in the Hotel Allen or meeting place in Mealey's handsome Auditorium) either left a thing to be desired as to accommodation, comfort or the like. However, about 10:30, President John A. Frick announced the opening of the meeting, and, having glanced at Secretary Lamson in a rather indeterminate way, announced that the "welcoming" by Mayor Wrenn had to go over, in that that official was detained by pressing official business—it was not positively known whether the Mayor had been in "Dutch." Routine, of course, was next in line, and this included an excellent report from the Secretary-Treasurer, and an enlivener from that official in respect of a big bunch of names for new membership account. The reports from standing committees included these: By Mr. Keppelman, from the Committee on Accounts, whose clever presentation culminated in the suggestion that the Committee be continued; with the instructions that the Council and the Committee be empowered concertedly to take up the matter of uniform accounts with the State Utilities Commission. Mr. E. C. Romine, in reporting for the Committee on "Industrial Fuel," said that it was not feasible to collect and tabulate the data on industrial installations as proposed. Mr. L. R. Dutton, speaking for Committee on "Gas Equipment for the Home," said that, in conjunction with the like Committee of N. C. G. A., they had finished their year's work, that the booklet for instructions was in press, and that copies should be ready for distribution the first week in May. He exhibited a cover-design, also sample pages, which decidedly went to show that no fault could be found with the get up. The report of the Council was followed by a brief statement from Mr. L. R. Dutton, respecting the status of the work done by the Joint Committee on International Gas Congress. Mr. Dutton concluded his presentation by saying he was merely paving the way for the extended statement, to be made personally by Mr. W. H. Gartley, President American Gas Institute, the morning of Friday next. The net result of the deliberations of the Committee on Nomination of Officers and the outcome of the subsequent balloting on the Committee's recommendations, resulted in the election of the following office bearers for 1915:

For President.—L. R. Dutton.
" *First Vice-President.*—J. E. Philbrick.
" *Second Vice-President.*—F. P. Duggan.
" *Secretary-Treasurer.*—W. O. Lamson, Jr.
" *Members of Council.*—C. H. Gotwals, Marshall Milton and Howard Hoffman.

The speech of Mr. Duggan, in acknowledging the honor put upon him, was simply great. The Committee on Next Place of Meeting was awarded a great shout, when it came to indorsing the proposition that next year's proceedings be conducted in Philadelphia. The Mayor now appeared on the scene, and I am constrained to say that the warmth of his welcoming message had not lost any of its heat unit strength, through having been delayed an hour or more. Mr. L. S. Bigelow "reciprocated" on behalf of the Association in his usual smiling manner and fluency of speech, after which Vice-President Dutton laid hold of the gavel, whilst President Frick delivered the yearly message. His matter-of-fact, well expressed message had for its main paragraphs some speculatings as to the effect that would be exerted on the industry by the acts and ratings of the Pennsylvania State Commission. The address having been considered, Mr. C. O. Bond, President of the Illuminating Engineering Society, followed with a decidedly interesting short talk on the "Conservation of Energy and Efficiency." And Mr. Keppelman well expressed the appreciation by the Association of Dr. Bond's presence and efforts in a hearty vote of thanks to him. At 11:50 A.M. the morning session was at an end. The afternoon sitting was commenced at 2:20, and the first number to have our attention was the excellent paper, by Mr. Marshall Milton (Hagerstown, Md.), on "Improving Operating Conditions in Small Works." That he had selected a live topic, and that he had treated it interestingly were best shown in the discussion that it brought about. Possibly two thirds of those present joined in it, and the end thereof was not until 4:20. The first "Short Topic" then came to hand. Its titling was "Uniform meter charge and handling of minimum charge on prepayment meters." This was recognized as a subject respecting which the Companies represented in the Association should be in thorough accord, especially in view of considerings along these lines whether in citation before a local or State authority. This, too, proved so fertile a field for debate that adjournment hour found it unfinished, so the understanding is that it will be threshed to a finish first thing to-morrow. Now for the theater, and then?—CAMP.

HOTEL ALLEN, ALLENTOWN, PA., April 9, 1914.

We will say nothing about last night, although much that is pleasant could be written thereon. A beautiful morning greeted us, and at 10:20 A.M. the second day's session was in full swing. The discussion on "Short Topic No. 1," which was the unfinished business of yesterday afternoon, was resumed. At its ending it was resolved to authorize the Public Relations Committee, when opportunity affords, to ask the Commission to declare 50 cents (or more), as a reasonable minimum monthly charge. Mr. Keppelman reported for the Public Relations Committee in respect to arrangements for obtaining day-to-day notifications for members of the Bulletins issued by the State Commission on subjects affecting the gas business, and Mr. J. B. Klumpp took up various provisions of the rules about to be promulgated by the Commission, galley proofs of which were in his possession. The rules set a calorific standard of 570 B.T.U., monthly average, with an allowable minimum of 520.

In the absence of Mr. Cadwallader, Secretary Lamson read the

former's paper on "Office Practice." Amongst the 15 or more who discussed this paper was Mr. P. R. Young, President, the N. C. G. A., who insisted on trying for uniform capability in employees, in that no one department or position needs the particularly good man, in that every division needs him. Mr. Young here gave a splendid resume of the work and worth of State Associations, and the value of Association meetings. He stated that value was not to be measured altogether, or even partially, by that which one obtained from others, but rather by that which one could give; and the more one gave the more one received. There was room for all the Associations, and there could not be too many, in that the greater the number the greater the exchange of thought. For instance, one good work of the Pennsylvania body was the useful, yes, valuable, book on "Gas Equipment of the Home." The National Associations were doing good work, which work was vastly bettered by the doings of the smaller organizations.

Speaking of the work of the N. C. G. A., he told of the 3,900 enrolled in the Educational Course, and of the very high merit of the average answers to the lessons. President Frick thanked Mr. Young for his speech and his presence, and, after some announcements by the Secretary, the business sessions were adjourned to to-morrow morning. For the afternoon three things are on: The baseball game, between teams of the members; a bowling tournament, and a trip to the works of the Allentown-Bethlehem Gas Company. I might say that no other State Association has had the distinction of hearing the three Presidents of three National Associations. President Bond spoke on Wednesday for the I. E. S.; to-day President Young, of the N. C. G. A., addressed the convention; and to-morrow (Friday) we are promised the pleasure of listening to an appeal from President W. H. Gartley, of the A. G. I., respecting possitive action over the proposed International Gas Congress, San Francisco, 1915. I will be unable to get to-morrow's report of the doings here in time to anticipate your going-to-press hour.—CAMP.

PANAMA-PACIFIC INTERNATIONAL EXPOSITION'S SYSTEM OF HEATING AND LIGHTING BY GAS. SCIENTIFIC SCHEME OF PIPING FOR HIGH PRESSURE DISTRIBUTION DESCRIBED IN DETAIL.

By MR. GUY R. KINSLEY.

Gas is to be an important and versatile factor in the success of the Panama-Pacific International Exposition. Gas will share with "Old Sol," who smiles perennially in San Francisco, and the matured descendants of the modest electricity that Franklin lured to stay in New England, the glory of "enlightening" the world to its progress. To gas also falls the duty of driving the chill from great buildings at night and feeding at any hour the hungry mouths that may crave any food, from hot bouillon to a table d-hote dinner; added to these will be its part in the spectacular lighting effects that are to transform the various courts.

And then, as if these functions were not sufficient to employ one agency, gas will literally and figuratively "blaze" the way for the coming decade's progress in the science of heating and lighting, and several tributary fields. The Exposition is to be a pathfinder for the latest inventions in these lines, and for 10 months the grounds will be a vast experiment ground and station for the observation of world experts. And, when this period is ended, success or failure will be emblazoned to every clime on the globe where civilization may bend a listening ear and turn a watchful eye. The very system by which the 635 acres of ground are piped for the demands to be made in 1915, is a testimonial to the great advance that has been made in a branch of the gas distribution science that was almost unknown at the time of the Louisiana Purchase Exposition, in 1904.

St. Louis gas engineers, engaged in solving the Exposition problem of gas supply at that time, found the Exposition removed from the center of gas distribution, which placed them at a disadvantage, for they had no large feeders. They depended on a low pressure gas delivery from the St. Louis mains.

Since 1904 there have been rapid strides in the development of high pressure gas distribution, both for direct service and for boosting or reinforcing low pressure systems. The Panama Pacific International Exposition grounds are fortunately situated, as far as gas delivery is concerned, in being located directly on a high pressure loop extending from the gas works at the south end of the city almost around San Francisco to the North Beach holder station. This loop is a 16-inch steel main, and its approach to the North Beach is through Webster Street, which is almost the spine of the exhibition grounds. From this 16-inch main is taken an 8 inch steel loop, extending completely around the grounds. Another loop of 4-inch pipe circles the State and foreign pavilion sites. The portion of exposition grounds, east of Webster Street, including the amusement concessions, will be supplied from an 8-inch steel loop.

The reason of extending these gas mains in the form of loops is to avoid what is generally known as "dead ends;" these are the terminals of gas mains farthest removed from the source of supply, and in these "dead ends" there is naturally a reduction in pressure, according to the volume of gas taken from them, until in the point most remote the pressure is low and the service unsatisfactory. This refers mainly to low pressure gas distribution, but would also apply in a measure to high pressure distribution. Experience of past expositions has proven the disadvantages of both low pressure and "dead ends." The laying of gas mains in loops, returning to the source of supply, equalizes the pressure and provides a system where the circulation of gas is perfect and the pressure uniform. Low pressure distribution is always considered as that force exerted on the gas by the weight of the gasholder, or by rotary boosting fans, and the pressure is measured in terms of inches of water in a syphon pressure gauge. Low pressure is commonly used for cooking, lighting and heating, and the pressure is from 4 to 6 inches or about $\frac{1}{7}$ to $\frac{1}{4}$ of a pound to a square inch. This was the pressure of gas given other expositions that utilized gas on the grounds and buildings.

A requisite for low pressure distribution, which has been lacking in past systems, is the laying of large mains. They should also be large enough for unusual demands. All of these defects are obviated by the high pressure system installed at the 1915 exposition grounds. The gas is delivered into steel mains of smaller size, under pressure measured by pounds to the square inch, and the pressure is reduced by a regulator at each customer's meter, to a pressure in inches of water necessary to give the best results for the particular purpose for which the gas is to be used.

For instance, for ordinary incandescent gas light a pressure of from 4 to 6 inches is most satisfactory, while for industrial uses pressure to as high as 1 pound may be employed with greater satisfaction and economy; and for the latest installation of high pressure power lamps for street lighting, such as are now used in London, Paris and Berlin, and which will be used for lighting the amusement and other streets at the Exposition, a pressure of 2 pounds applied directly to the mantle gives the greatest lighting efficiency.

Another advantage of high pressure over low pressure is the ability to increase the supply of gas by increasing the initial pressure. In the low pressure systems the increase in demand can only be provided for by the installation of larger pipes or boosting the low pressure with consequent leakage of joints of cast iron mains. And in this matter of joints and mains the system prepared by the Pacific Gas and Electric Company for the International Exposition is far in advance of any used anywhere else, whether in an exposition or community. The San Francisco Company is the pioneer, and the Panama-Pacific International Exposition is the greatest demonstrator in the world, of a loop system without joints. And it is a system of more than 9 miles of pipe within the fence that encloses the world enterprise.

All the steel tubes are welded together by the oxyacetyline torch, using rods of Norway iron for the welding material. These welds are actually stronger than any other section of the great st. el pipe, and the mains, when finished, consist of an endless welded tube without leaks. They are tested for leaks under a pressure of 100 pounds to the square inch, and when they have proved to be tight under this pressure they will be absolutely tight under the working pressure of 40 pounds to the square inch maximum, which will be supplied to the Exposition.

The average pressure will be nearer 30 pounds. On Geary street, San Francisco, the first strip of welded steel pipe ever laid for high pressure was installed about 2 years ago and the Exposition test will be of great value in demonstrating the advantages of the new plan.

(To be Concluded.)

CURRENT MENTION.—

MR. A. H. STRECKER sails from New York for Europe this week, per steamer "Saxonia," for a trip abroad that will cover 2 months or more.

MR. WALTER DINNEEN, who has for quite a while been stock clerk for the North Adams (Mass.) Gas Light Company, has been appointed to the vacancy on the accounting staff, occasioned by the resignation of Mr. Henry Tower.

MANAGER DANIELS, of "The Westerly," Pittsfield, Mass., has given the contract to the Pittsfield Gas Company for the installation in its kitchens of a complete hotel gas cooking outfit, including a new range, steam tables, broiler, ovens, coffee urns, etc.

MR. L. W. HESS, General Superintendent of the Northern Illinois Light and Traction Company, of Ottawa, Ills., has also taken over the management of the Citizens Lighting Company, of La Salle, Ills.

MR WILLIAMS, of Pottstown, Pa., has been promoted to the Superintendency of the entire Jenkintown division of the Philadelphia Suburban Gas and Electric Company.

MR. L. V. CHRISTY, Secretary, the Board of Directors of the Street and Sewer Department of the City of Wilmington, Del., will receive sealed proposals, until 12 o'clock, the 28th inst., for lighting certain streets or portions thereof of the City of Wilmington, Del., by means of incandescent mantle gas lights. The number to be tendered on shall not be less than 650.

(Continued from page 231.)

No. ..... To ..... Inc. DATE .....

MAIN WORK DAILY PROGRESS REPORT

DISTRICT .....

LOCATION	SIDE	SIDE	SIDE	SIDE
INSTRUCTION NO.				
CLASSIFICATION				
SIZE MAIN	"	"	"	"
COMMENCED				
TOTAL LENGTH	'	'	'	'
DATE OF LAST REPORT OF INSTRUCTED JOB				
TOTAL OF LAST REPORT	'	'	'	'
REPORTED TO-DAY	'	'	'	'
TOTAL TO DATE	'	'	'	'
LAID OR OVERHAULED	LO	LO	LO	LO
ABANDONED TO-DAY	—OF "	—OF "	—OF "	—OF "
REMOVED TO-DAY	—OF "	—OF "	—OF "	—OF "
VALVE, DRIP, SERV. OR PRESSURE TEST. DTA.	VDSP	VDSP	VDSP	VDSP
FINISHED				
FOREMAN				

LEAKS: .....

REMARKS: .....

REC'D R. D. ..... ST. CLERK .....

20838 6—P.G.W. MAKE 3; ORIGINAL TO R. D., KEEP 1, 1 TO DISTRICT. 2M-5-17-13.

Fig. 28.—Progress Report.

MAIN RECORD. ..... District .

Nearest house No. ..... St.

Nature of work ..... Charge ..... Date .....

Size ..... Cover ..... Ft. ..... Ins. ..... Drips towards ..... St.

Location of Main ..... Ft. ..... Ins. ..... of ..... Curb-line of ..... St.

Location of Joint ..... Ft. ..... Ins. ..... of ..... Curb-line of ..... St.

Kind of Joint ..... Joint recaulked Yes No. ..... Bell faces .....

Foreman ..... Kind of paving ..... Base ..... Kind of soil .....

Location of Foreign Structure ..... Size ..... Cover .....

Remarks .....

Rec'd B. of R. .....

Sign here .....

Form 33 P. G. W. Make 2—1 to Bureau of Records—1 to District. 10M-6-29-10.

Fig. 30.—Main Record Card.

Curbs and corners are shown by a solid black line 1/32" wide, building and dimension line as in Fig. 31. Telegraph poles, lamp posts, fire plugs and pier lines, when needed for locations, are shown by conventional designs. Figures giving sizes, dimensions, covers, etc., are in black above the line indicating the main, the size being shown at right angles to the main. Solid line rubber stamps are used to designate the various forms of bells and specials. Reducers are shown solid, tapered to indicate change in size.

If pipe or specials are only partially exposed, the record indicates this.

Where a main is carried through the air, on or under a bridge, detailed information of its location is given. If a new bridge is being laid, a working plan is always prepared before the work is begun, and the record made by the street clerk serves as a check against this plan.

If a pipe laid above ground for temporary use is likely to remain several months, a special record is made.

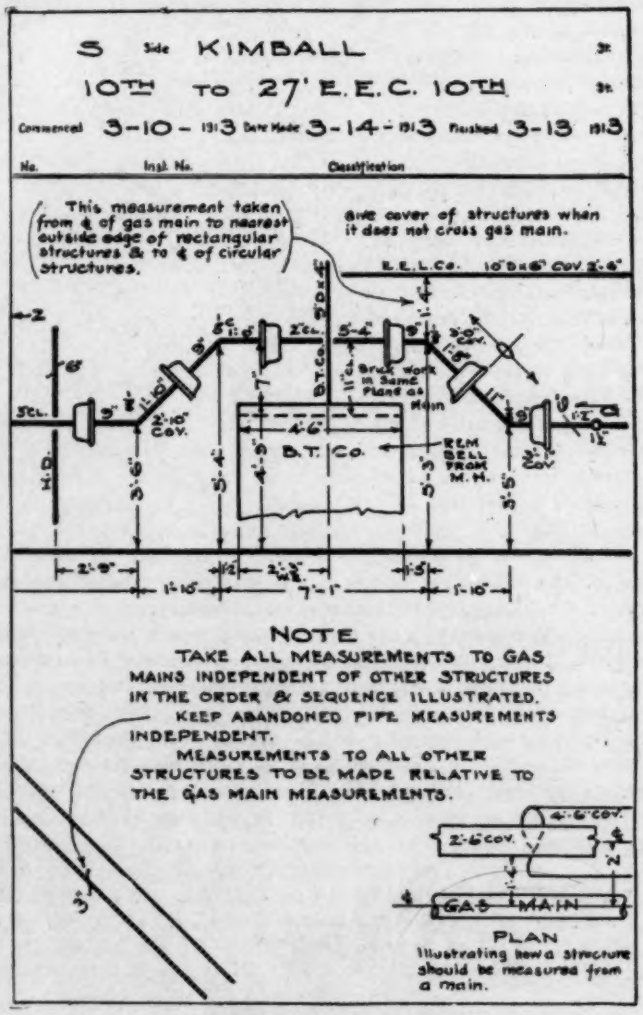

S Side KIMBALL St.
10TH TO 27' E. E. C. 10TH St.
Commenced 3-10-1913 Date Made 3-14-1913 Finished 3-13 1913
No. Insp. No. Classification
This measurement taken from ℄ of gas main to nearest outside edge of rectangular structures & to ℄ of circular structures.
Side cover of structures when it does not cross gas main.
E. E. L. Co. 10" D. 6" Cov. 2'-6"
B. T. Co.
Brick work in Service Plant as Main
REM. BELL FROM M. H.
NOTE
TAKE ALL MEASUREMENTS TO GAS MAINS INDEPENDENT OF OTHER STRUCTURES IN THE ORDER & SEQUENCE ILLUSTRATED.
KEEP ABANDONED PIPE MEASUREMENTS INDEPENDENT.
MEASUREMENTS TO ALL OTHER STRUCTURES TO BE MADE RELATIVE TO THE GAS MAIN MEASUREMENTS.
GAS MAIN
PLAN
Illustrating how a structure should be measured from a main.

Fig. 29.—Sketch Record Data.

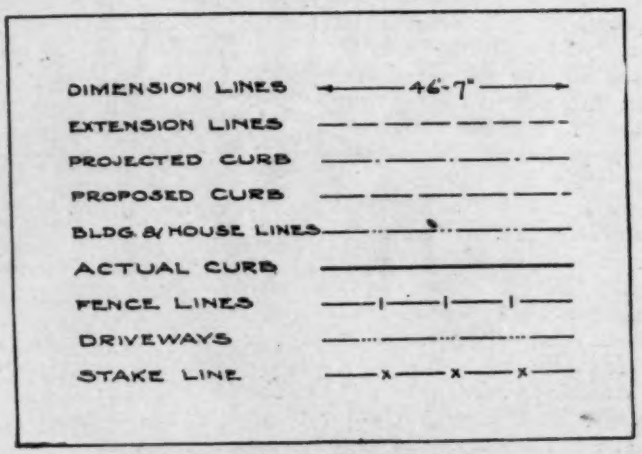


Fig. 31.—Building and Dimension Lines.

Where mains cross under steam railroad tracks, a plan is usually prepared in advance, and the record taken shows the relation between the tracks and the main, and is a check against the plan. For street car tracks no record is taken if the main crosses at right angles, but is always taken if main is under the track for some distance, or crosses under switches. All other information is noted on the reverse of sketch card (Fig. 32).

Only the size and general location of the main are transferred to the main chart proper, using water colors easily washed out. If the charts are on a scale of 50 feet to the inch, a fairly complete record may be made, but charts on a smaller scale are better for showing the mains in sections, with sketch records for necessary details.

The sketch records for the current month are kept in a special file, and after the monthly work has been properly recorded, are transferred to a permanent file, arranged alphabetically by street names, records for the same street being filed by street number. To make filing by number possible, a hypothetical number is assigned to every record. Where the work involves only a street intersection, or an

FORM. 32 P. O. W. 3M-12 9-12

MAIN WORK SKETCH RECORD.
DISTRIBUTION DEPARTMENT
RECORDS DIVISION

REQ. NO. ..... AMOUNT AUTH. .....

TOTAL PIPE LAID	PROGRESS REPORT	STRAIGHT PIPE ONLY	LENGTH CEM. LEAD
OF	OF	OF	
"	"	"	
"	"	"	
"	"	"	

TOTAL PIPE OVERHAULED "

OF "

" "

"

PLOTTED ON CHART		MONTHLY REPORT	MAINS LAID REPORT	NO. FT.	RECORDED	A. & R. PIPE DRAFTSMAN	BETTERED MAINS DRAFTSMAN	COMPARED FOR NOTES	HIGHWAY SUPERV'S.
NO.	DATE			OLD	DATE				
	INITIALS			NEW	INITIALS				

C. I. MATERIAL USED NO.

FOREMAN ..... CAULKERS ..... NO. .....

..... NO. ..... NO. ..... NO. .....

REMOVED .....

ABANDONED IN GROUND .....

JOINTS L. C. S. ..... PHOTO. NO. ..... ALBUM NO. .....

BUSINESS CLASSIFICATION ..... N. B. ..... A. B. L. ..... A. P. ..... A. R. ..... I. P. .....

NATURE OF WORK .....

.....

.....

.....

.....

RECEIVED, R. D. .....

..... STREET CLERK

PER ..... DUPLICATOR (Over)

Fig. 32.—Sketch Record Card.

intersection with some work beyond, in the direction in which the street is numbered, the number assigned is the highest number belonging to the intersection on that side of the street. If involving an intersection, or an extension, and extends beyond it in the opposite direction to the numbering, the number assigned is the lowest one on the building, or lot, on that side of the street in front of which the work is done. When a record embraces in part, or whole, a main covered by a previous record, it is filed behind the earlier record.

Bridge Mains.

With the growing abolition of grade crossings within the limits of towns and cities, has come a great increase in bridges carrying streets over the railroads. If it is necessary to convey gas across the railroad at any such point, the choice lies between crossing on the bridge, or under the tracks. As a rule, a crossing under the tracks will mean a long stretch of deep main on each side of the bridge, or else two vertical legs back of the abutment walls, or exposed on them, besides lots of red tape from the railroad company. So the choice will generally be for the bridge crossing, whether over railroads or water.

Location.—When installing a bridge main, the necessary permission often decides the location. Bridges are generally owned by the public authorities, but sometimes the railroad is joint owner. Unless the addition of extra weight is considered dangerous, permission is seldom refused, but public authorities often object to any location where the main will be in evidence. Generally such a prohibition means locating below the floor, and entails extra expense in installation and in maintenance; and occasionally if the head room is limited, the railroad company interposes with the provision that it must not be decreased. If the main girders separate the roadway from the footway, a location on the top of the girder is ideal. Next in point of desirability is on the bridge floor at the side of the roadway or the footway. Blocks with concave top fitting the main should raise it 1 inch above the girder, or floor, and a guard timber should protect a roadway floor main.

If no location is available above the floor and within the bridge lines, hanging along side of the bridge is usually preferable to under neath. Often by attaching brackets to the outside girder the main can be laid just outside the foot way railing, or if the footway girder is too light for additional weight, attachment may be made to the girder at the side of the roadway, bringing the main under the footway.

There may be instances where the only possible location is under the main floor. Most new metal bridges over railroads are protected from the action of the locomotive gases by a tight wooden sheathing over their whole bottom. Only as a last resort should a pipe be laid between such sheathing and the floor. So laid, it will be inaccessible for examination and painting, will be exposed to many corroding influences, and leaks will be hard to detect and a great source of danger. Where there is no sheathing the location under the bridge will be determined by cost, maintenance, etc. If under the bridge, provision should be made at time of installation for means of ready inspection, generally a platform under the pipe or hangers in which boards may be slipped.

On a reinforced concrete arch bridge location above the floor, or along the bridge sides, is usually prohibited as spoiling the artistic effect. Location under the bridge would mean a small stretch of main exposed in an inaccessible place, with most of the pipe buried in the bridge arch, and necessitates laying the pipe while the bridge is being built. In most cases there should be no hesitation in letting the pipe be entirely built into the bridge as low as allowable without exposure under the arch, and avoiding contact with the cinder base of the bridge surface. If a leak should develop there is little chance of gas finding a way out through the concrete. In fact, it is worth considering, where the length is great and the saving would be considerable, whether a cylindrical passage formed in the concrete would not suffice.

There is no excuse for any company allowing the erection of a bridge with a present or possible need for a main, without making an attempt to have the location of the main settled. In large cities the official in charge of bridge work generally notifies the company of bridges planned, and asks their needs as to pipe crossings, but even without such notice, it is easy to have a knowledge of all proposed bridges.

If the main is to be alongside or under the bridge, the work of laying can be greatly cheapened by opening left in any masonry, and by holes drilled in, or brackets fastened to a girder, before it is put in place. A good plan for openings in masonry is to have the contractor place thimbles at places designated by the plant, the thimbles to be furnished by the company.

Material.—Cast iron pipe with lead joints will probably need frequent re caulking, due to vibration of the bridges and temperature changes in exposed pipe. With cement joints in 12″ or under, vibration would probably not cause leaks, but temperature changes probably would, and both in larger sizes. Cast iron buried in a concrete bridge is perfectly satisfactory, but the thickness of the bridge at the arch crown may be so small that the lesser diameter makes wrought iron pipe preferable for the concrete bridge, as it certainly is for the wood or metal bridge.

Joints.—For mains 6″, or under, screw coupling is advisable. For 8″ possibly, and for 12″ and over certainly, a rubber or asbestos joint with plain end pipe should be used. As compared with screw pipe, there will be a saving in first cost (always in labor and often in material) and in maintenauce, for each joint acts as a expansion joint and there should be no leaks. If screw joints are used, an expansion joint is advisable for each 100 feet of exposed pipe. If only one expansion joint, it should in the middle of the line; where more than one, they should equally spaced. Expansion joints should be firmly secured to the bridge, to prevent one joint taking up all the movement. Where the wrought iron joins the cast pipe (usually just before the main goes underground) it is often easy so to locate the necessary specials, that any thrust or pull will be taken up by a swing joint.

Size.—The size of the bridge main is ordinarily that of the main on either side, but in cold climates it is a mistake to lay smaller than 4″, and in many cases smaller than 6″. If the region supplied is growing, or of large extent, the main should be large enough to care for the future. If above 12″, the size of the main may very largely increase the expense of the job; it may be good practice to make the bridge main smaller than the pipe to which it connects.

One way of avoiding the use of very large pipe on a bridge is to lay two or more mains. In one case a concrete arch bridge was built over a railroad, well in advance of any development on the street. Future plans called for a 20″ main, but it was found that the depth over the arch would not permit larger than a 12″ wrought iron pipe. Permission to lay alongside or on top of the bridge could not be had,

and to go under the railroad was not advisable. Therefore, two 12″ wrought iron pipes side by side were laid in the concrete. They, of course, will not give the capacity of a 20″, but the bridge is less than 80 feet long and a third 12″ pipe did not seem justified.

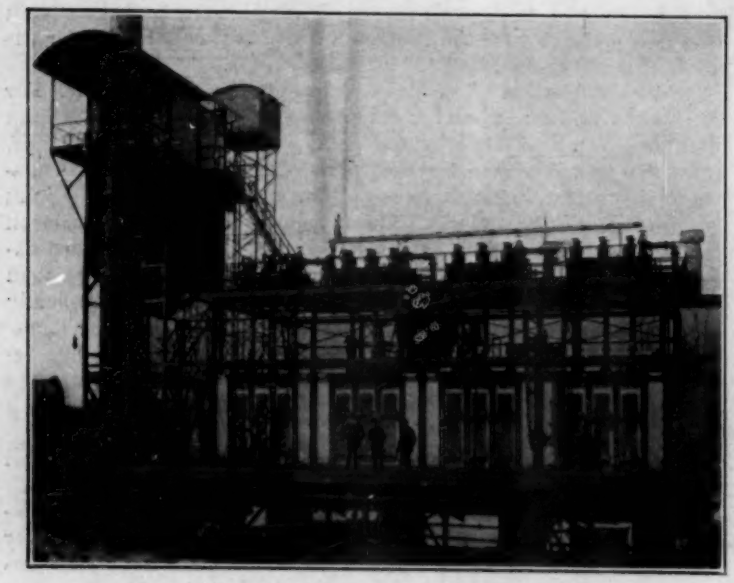
Except where required for artistic reasons, or as protection from gases of combustion, or because of severe cold, it is not advisable to enclose the main; but it should be painted with red lead, and then a dull color. A painted pipe is less conspicuous, and takes less room, than when boxed. A cast iron pipe with its large bells does not look well. A boxed main on the floor or side is a great collector of dirt, and corrosion will progress faster on a covered main than if bare. Any covering makes inspection difficult, and leaks more dangerous. In some cases, however, a wooden shield under the main, to protect it from the gases from locomotive or boat stacks, is quite necessary.

In the days when a 6″ was a large main the rule was to make the pipe over the bridge at least a size larger than the underground pipe, but in these days of large mains it is not necessary for latitudes south of New York city. Where the climate is severe enough to warrant enlarging the pipe, the question of protecting all exposed pipe needs to be considered. Whatever covering is adopted, care should be exercised to make it water-tight, in order to keep the insulating efficiency high and prevent corrosion. Canvas, well painted, makes an excellent water proof cover.

Bridge mains being more liable to injury from atmospheric and other external causes, should receive a periodical and careful inspection for condition, in addition to the perfunctory inspection by the line-walker. This inspection should be at least yearly, in the fall, to ensure that everything is right for winter. It will usually show necessity for repainting, for minor repairs to platforms and coverings, and in the case of cast iron pipe, a resetting of some joints. Where pipe is exposed to the action of combustion gases, it is also well to have an idea of how fast corrosion may be proceeding. One 12″ cast pipe under a bridge crossing busy railroad track was found to have in many places less than ¼″ of metal.

A Small Oven Unit, Koppers Type.

American gas companies must be alive to the fact that conditions under which gas may be made and distributed profitably are undergoing radical changes. The increasing cost of oil, together with the elimination of the candle power standard, is making the manufacture of carbureted water gas a doubtful undertaking. Coal gas, when made under favorable circumstance, presents a solution of the problem which must be met by those managers who desire to be up with the spirit of the times.



Kopper's Small Coal Gas Unit at Innsbruck, Austria.

The profitable manufacture of gas for fuel and power demands the distribution of large quantities at low prices; and to meet this demand, gas must originate in gas coal and be extracted by a system developing the largest amount of gas and saleable by-products from a ton of coal, and also must be accomplished with low labor and low investment costs.

To meet this demand, the H. Koppers Company have developed the Koppers small coal gas unit. This installation has many distinct advantages, not the least being the very low first cost as compared with the various systems of retorts now on the market. The fact that the ovens are built of the highest grade of silica material, after methods which have been tried and proved by years of successful experience, insures operation with minimum repairs.

The oven battery, consisting of from 10 to 16 six-ton ovens, is so designed that no labor is required at night other than a watchman, and the engineer, who cares for the minor machinery in the by-product house. The ovens are pushed and charged always during the day, with the additional advantage that they may be shut down over Sundays and holidays without damage or loss. Nine men, during the 24 hours, are ample to take care of the entire operation, including coal and coke handling and by-product apparatus.

The heat for carbonizing the coal is furnished by the "built in" producers, and therefore the total gas from the coal is available for distribution and sale. While the quantity made per ton of coal, and its quality, will vary with the kind of coal used, it may be said, without fear of contradiction, that in no other coal gas manufacturing system can better results be had from a given coal.

With the oven unit is included a complete by-product plant, equipped with the Koppers Direct Process for the Recovery of Ammonia Sulphate, recognized a fine best method of ammonia extraction, and comprises tar extractors, exhauster, tanks, coolers, and all appliances necessary to produce a clean, satisfactory gas, while recovering the maximum of by-products in their most saleable form.

With a first class gas coal, this installation will give the following products per day from a 60-ton, 10-oven plant:

30 tons of good, hard coke.
3 tons of breeze.
600 gallons of first quality tar.
¾ ton of ammonium sulphate.
600,000 to 650,000 cubic feet of 600 B. t. u. gas.

And the plant, including sufficient coal and coke storage, will occupy one acre of ground.

The gas made can be distributed with the sanction of probably all Public Utility Commissions in the United States. It will have a calorific value of 600 B. t. u.'s, and the candle power will approximate 16 candles on a Sugg "D" burner.

The quality of the coke made is in a large measure dependent upon the character of the coal used in the ovens. With the plant operated to give a 600 B. t. u. gas, the coke will be of first quality for domestic use, and may be used for many purposes demanding metallurgical coke. Foundry coke can be made on this plant, but the character of the coal must be such as to give this quality of coke.

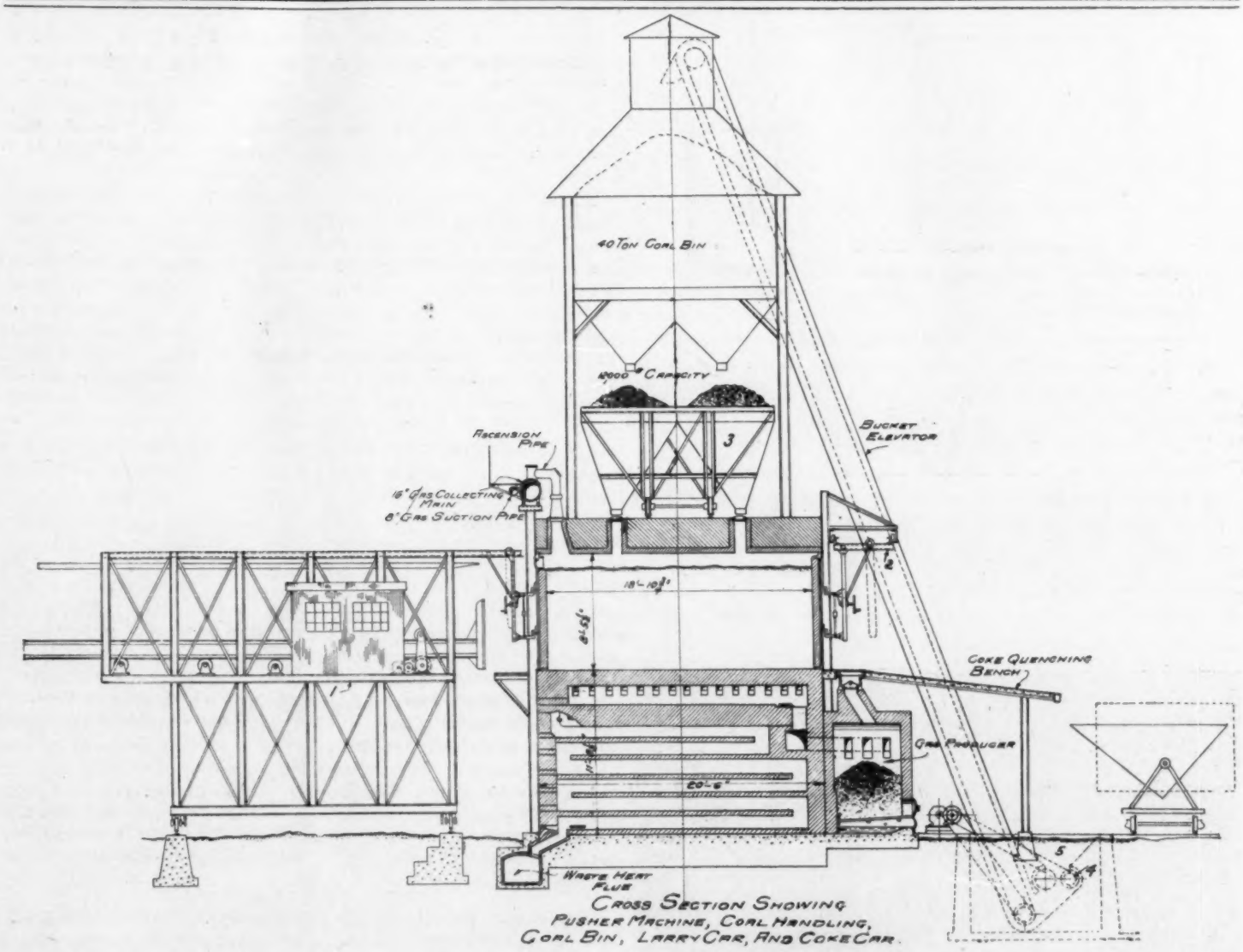
The tar will be of low viscosity, containing not over 6 per cent. free carbon and a minimum of unsulphoniable ingredients. Its distillation will give a large percentage of creosote oil and a minimum of pitch.

Ordinary gas work practice secures that part of the ammonia recoverable in the form of ammoniacal liquor, and necessitates the storage of liquor, which, owing to the volatile nature of its valuable ingredient, is continually subject to loss by evaporation, and by pumping.

This unit is equipped with the Koppers direct process by which ammonia is recovered from the gas directly in the form of a fixed salt that may be stored indefinitely without loss. Sulphate of ammonia is a valuable ingredient of many fertilizers and, as such, finds a ready market at a high price. The oven system of coal carbonization gives more ammonia than the retort systems, and the direct process increases markedly the amount recovered for sale. In fact more than 99 per cent. of the ammonia formed is extracted.

The first installation of this type of small plant was built by Heinrich Koppers at Innsbruck, Austria, in 1908. It was a success from the start, and was so favorably looked upon that it was followed a year and a half later by additional ovens. It is in successful operation to-day and giving excellent results. The report of the Director of the Innsbruck works, made in 1913, indicates his entire satisfaction with the plant and gives the results for the year's operation as follows:

Coking time, hours	24.0
Coal charged per year, net tons	12,665.5
Volatile matter in coal, per cent	32.0
Gross coke produced, net tons	9,120.98



Cross Section Showing Pusher Machine, Coal Handling, Coal Bin, Larry Car, And Coke Car.

Tar produced, gallons	169,490.0
Ammonium sulphate produced, net tons.	128.75

Production per Net Ton of Coal Gasified.

Gas at 30 in., 60° F., cubic feet	11,024.
Coke, pounds	1,440.
Tar, gallons	13.38
Ammonium sulphate, pounds	20.3

Coke Balance.

Coke produced per net ton of coal, pounds	1,440
Coke used for firing, pounds	254
	1,186

Gas Results at 30-Inch, 60° F. Sat.

Per pound of coal, cubic feet	5.512
B.T.U., per cubic foot	595.0
B.T.U., per pound of coal	3,279.6

The above cut shows a cross section of the oven plant.

Lump coal is dumped from the railroad car into the coal boot and crusher (4 and 5), whence it is elevated by the conveyor to the overhead bin, which has a capacity to run ovens 24 hours.

From the overhead bin the coal is run into the charging larry (3), which is pushed along the battery until it comes over the oven to be charged. In the meantime, the oven doors have been removed, the coke charge has been pushed out by the electrically operated pusher (1) onto the quenching bench, where it is cooled. The oven doors having been replaced, the coal from the larry car is allowed to run into the oven through the oven charging holes at the top, and is leveled simultaneously by the electrically operated leveler bar on the pusher machine. The larry car is then run to one side, the charging hole covers replaced and the valves opened to the gas collecting main. This entire operation requires about 15 to 20 minutes. In a plant of 10 ovens, 5 ovens are charged in the early morning, and 5 in the late afternoon.

Coke for the gas producer is pushed from the quenching bench directly through charging doors of the producers. These producers are so designed that the slag may be readily removed at the bottom.

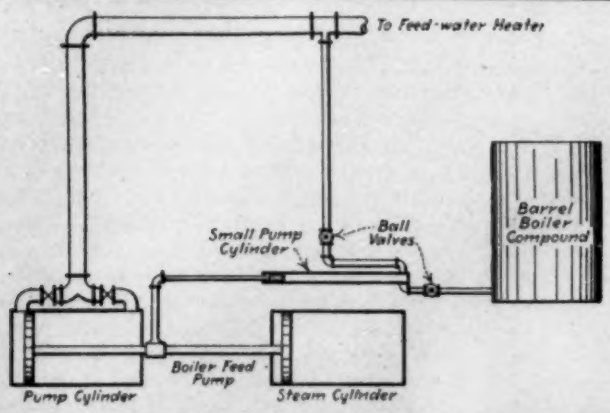
The gas delivered into the collecting main is drawn by the exhauster through the cooler, where it is cooled and a large portion of the tar condensed. It is then pushed through a tar extractor and a reheater into the saturator, where it is made to bubble through a saturated solution of ammonium sulphate containing about 5 per cent. free sulphuric acid, precipitating the ammonia as crystalline sulphate of ammonia, which is subsequently removed and dried. The gas passes through the purifiers, which remove the sulphur, and is then ready for distribution.

The plant is complete for making either illuminating or fuel gas and for the recovery of all by-products.

New Methods and Appliances.

Criticizing the Term Flameless Combustion.—Nicolae Teclu criticises the use of the term "Flameless Combustion" in connection with the surface combustion of inflammable gaseous mixtures, and maintains that such combustion is invariably accompanied by the production of flame. The invisibility of the flame in the surface combustion of inflammable gas mixtures is, he says, due to the luminosity of the flame being very feeble in comparison with the heated surface at which combustion occurs.

Pump for Feeding Boiler Compound to Feed Water.—In the steam plant of the Illinois Northern Utilities Company, at Sterling, Ills., a small pump cylinder has been attached to the boiler-feed pump in such a way that at every second stroke a predetermined quantity of boiler compound is added to the feed water. As shown in the cut, the cylinder of the small compound pump is held stationary while its plunger moves with the piston rod of the boiler-feed



pump. Thus at alternate strokes of the latter a measure of compound is injected into the feed water line to the heater. Ball check valves prevent a reversal of flow in the pipe line carrying the compound.

AN ENGLISH CLINKERING MACHINE.—The machine shown in the cut is the invention of Mr. M. Gill, Asst. Engineer, the Commercial Gas Company, Stepney, London, England. It was originally designed for clinkering producers, but is also applicable to water gas generators. It is essentially a long stroke cylinder, swivel mounted on a carriage, and having a chisel or drill pointed plunger, made to

reciprocate by compressed air, steam, or hydraulic power. To use the machine it is run in front of the open clinkering door, secured to the floor by chain shackles, and the operator has easy control of the direction, length and force of each blow delivered. The machines are found very durable, give dispatch in clinkering, and saving in labor as well as fuel lost while doors are open.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,090,094. Automatic Gas Saving Attachment for Gas Stoves. L. H. Bear, Los Angeles, Cal., assignor to Bear Automatic Gas Stove Co., same place.

1,090,163. Combined Solid Fuel and Gas Range. C. H. Miller, Cleveland, O.

1,090,202. Bunsen Burner for Heating or Illuminating. G. H. Denny, Newark, N. J.

1,090,490. Apparatus for Trapping Solid Particles in Suspension in Gas Currents. T. E. Murray, New York city.

1,090,507. Gas Meter. H. B. Thornton, Cincinnati, O., and J. W. Hammond, Long Beach, Cal., assignors to A. E. Davis, San Diego, Cal.

1,090,635. Spring Ring Shade Holder. T. J. Litle, Jr., Woodbury, N. J., assignor to Welsbach Light Co., Gloucester City, N. J.

Items of Interest
FROM VARIOUS LOCALITIES.

MR. E. J. EGAN, formerly Agent in Winchester and Lexington, Ky., for the Central Kentucky Gas Company, has been appointed Agent for the Tri-State Gas Company, with headquarters in Steubenville, O.

AT the annual meeting of the Cohoes (N. Y.) Gas Light Company the officers elected were: President and Treasurer. Lorenzo Semple; Vice-President and Assistant Treasurer, Charles B. Samuels; Secretary and Manager, Willard P. Parsons; Assistant Secretary, D. H. Van Auken. The Directors, too, passed a resolution ordering an immediate reduction in the selling rate to $1 per 1,000 cubic feet, instead of the prevailing one of $1.20. The Company not long since promised the residents that the $1 rate would be put into effect January 1, 1915, but the Directors eventually concluded to antedate that period by 9 months or so.

ACCORDING to the Fifth Annual Report of the Public Service Corporation of New Jersey, as to its gas division (the year ended December 31, 1913), the following was reported: "Gas sales increased 622,290,652 cubic feet; but, owing to the reduction in rates imposed by the Public Utilities Commission, and referred to in last year's report, which took effect in the Passaic division February 1, and in the other divisions of the Company May 1, the revenue from the sale of gas for the year decreased $125,929.41. As for many years past the increase in the sendout of gas has averaged 7 per cent. or more, and as this year, with the reduced rate in effect throughout nearly all the period, it increased only 6.48 per cent., a complete denial is apparently furnished to those who insisted that the reduction in the price of gas would be accompanied by an abnormal increase in the quantity used. Such is not the case."

THE Gas Machinery Company is furnishing benches with high grade, sectional silica retorts and settings for Cobourg, Ontario; Ishpeming, Mich., and Painesville, Ohio. This is the third order for benches from the Ishpeming Company, and the second order from the Painesville Company.

IT is reported that certain Philadelphia capitalists have been granted a franchise for the construction and operation of a gas plant at Palm Beach, Fla.

AT the hearing before the Public Service Commission, Second New York District, Commissioner Martin L. Decker presiding, testimony was advanced objecting to the Phoenix (N. Y.) Gas and Electric Company continuing plant construction until the question of franchise is decided. The Commissioner ruled that active work must cease, until that decision is made.

WE understand that the Stone & Webster Engineering Corporation, Boston, is proposing to expend $250,000 for improvements and extensions on its gas, electric light and power plants, Columbus, Ga.

THE Gas and Electric Department, of Holyoke, Mass., has issued an order discontinuing the practice of allowing users of electric currents to exchange their burned out lamps for new ones without charge. Hereafter all globes will be sold at cost price.

AT the annual meeting of the Pacific Gas and Electric Company, which is to be held tomorrow, the shareholders will likely be asked to vote on a question of further new financing. Recently there has been much discussion in respect of a report that that Company planned to raise $12,000,000 additional 6 per cent. preferred stock, to be sold to preferred stockholders at 80. Interests close to the Company are quoted to the effect that, "while the issue of preferred stock has been under consideration, no definite decision has yet been reached on the subject."

"'FRANK' D. KINGSBURY (he will always be 'Frank' with his intimates) reached his place of business, in Concert Hall, Corning, N. Y., the morning of the 26th ult., and was stumped for perhaps a minute. The ordinarily prim business quarters were positively like a hot house crowded with rare blooms. However, the aforesaid speedily identified the floral connection with the date of his first work for the Corning Gas Company, on March 26, 1864. His father (L. C. Kingsbury) whose fame as a carriagemaker was pronounced through-

out the United States, was then President of the Company, and in 1864 the Kingsburys obtained complete control of the Company through the purchase of the interest theretofore owned by Charles H. Thompson. He has been and is actively identified with many other leading businesses and industries in Corning, has served his city faithfully and well in many prominent and important places of trust, and is now President of the Board of Trustees of the First Presbyterian Church of Corning, and is quietly identified with the charitable work thereof. Hale, hearty and handsome, he is the worthy son of a splendid sire, and the hope and belief of every resident of Corning is that many are the days left him for their mutual benefit and communing.—M. B. B."

THE Southern Heat and Light Company announces that the Jennings (La.) Electric Light and Power Company has been absorbed by it, and hereafter the corporation will be known as the Jennings Gas and Electric Company, under the direct management of Mr. F. N. Litten. The properties, too, it might be here noted, are controlled by local capitalists, the only out-of-town holder of importance being Mr. Duffy, of Natchez, Miss.

WE understand that the "mixed process" plant, which formerly afforded more or less light to the residents of Jewell, Iowa, under the corporate title of the Jewel Gas Company, but which has been in a dormant state since May, 1912, was recently sold at sheriff's sale, Webster City, Iowa. The purchaser was Mr. George W. Foval, of Jewell, who declares it is not his intention to operate it; rather to dismantle it and sell the "remainder" for junk. The real estate, or site, on which the plant was erected, is an available bit of property.

AT a recent meeting of the lower Board, General Council, Louisville, Ky.. an ordinance, providing for the appointment of an Inspector of Gas and Electricity, at a salary of $3,000 per annum, 2 deputies, at 1,500 each, and an assistant or clerk, at $1,200 was passed.

THE Chamber of Commerce, Cordele, Ga., is again agitating the matter of granting a franchise for the construction and operation there of a gas plant. This time the applicant is said to be Mr. W. E. Davidson, Chicago, Ills.

IT is worthy of note that the output of the Boston Consolidated Gas Company for last month was 3.99 per cent. over that for March, 1913. The increase in the latter month over the output for March, 1912, was equal to 3.64 per cent.

THE Gas and Electric Department, Holyoke, Mass., Mr. John J. Kirkpatrick, Manager, announces his readiness to receive tenders for several supplies in connection with the operation of the public gas and electric lighting plants. One item in connection therewith calls for proposals or tenders for a coke conveying and crushing plant, bids for which will be received up to 2 P.M., the 21st inst.

"V. L. R.," writing from Woonsocket, R. I., under date of April 4th, says: "I failed to note in the JOURNAL any mention of the semi-monthly March meeting of the Employees' Club, Blackstone Valley Gas and Electric Company. It was especially noteworthy in that it proved the banner meeting of the organization. And that is going some, for many useful meetings are on the Club records. After a generous dinner, served in the Club rooms, Mr. Joseph Pratt called the business session to order. The routine having been speedily disposed of, George L. Davis, Chairman of the pool tournament committee, reported the close of the tournament, and announced that William Keough had been returned the winner thereof. Whereupon Mr. Keough was presented with the beautiful silver cup prize, donated by Manager A. F. Townsend. Keough may be great on 'combinations' and 'crosses,' but he can't even 'scratch a speech.' The speaker of the evening was Mr. W. H. Blood, Jr., valuation expert for the Stone & Webster Management Association. His subject was, 'The Hydroelectric Developments of the Puget Sound Region,' and for an hour he held the close attention of his hearers while describing some of the wonders of the great States of Oregon and Washington. He dwelt at length upon the speedy growth of their leading cities, and displayed views of the hydroelectric developments at White and Puyallup rivers, and Snoqualmie Falls, properties of the Stone & Webster Corporation. He noted the difficulty of engineering methods in these operations, especially in respect of repressing the streams. A portrait of the first white settler (still living) in the Puyallup region was shown, also a picture reproducing the first house erected. To show the difference the next picture represented a business view in Seattle, to-day one of the most beautiful cities in the country. His lecture concluded, Mr. Blood was awarded a rising vote of thanks. Our next meeting will be the evening of the 9th inst., or the Thursday prior to the appearance of your next issue."

MR. H. K. MORRISON, according to current advices, will continue to remain the active head of the Brockton (Mass.) Gas Light Company, besides performing the duties of General Manager, the Lynn Gas and Electric Company.

CITY SOLICITOR JAMES W. MCDONALD, pursuant to instruction of the authorities of the Massachusetts towns of Hudson, Southboro and Westboro, has retained Prof. W. L. Puffer, formerly of the Massachusetts Institute of Technology, to assist in an examination of the plants and books of the suppliers of gas and electric currents in the named places. Mr. McDonald, having read the reports from the named districts, as these were supplied for the better information of the Massachusetts Board of Gas and Electric Light Commissioners, has reached the conclusion that gas and electric rates in Hudson, Southboro and Westboro are altogether too high. Sometimes luck is hidden in what seems a menace, and in this instance an example thereof seems afforded. At any rate, we venture the thought that when the authorities, aided by Puffer, have examined the books, it is not altogether without bounds that they would not object to a petition for the increasing of minimum gas rates in at least two of the towns concerned.

MR. HARRY TOWER, for some time on the accounting staff of the North Adams (Mass.) Gas Light Company, having been appointed Assistant Treasurer and bookkeeper to the Hoosick Savings Bank, has resigned from the former's service. He succeeds Mr. Marcus T. Reynolds, who wishes to devote his entire time to the development of valuable properties owned by him in Hoosick, N. Y.

MR. E. L. LAMBERT, Manager the Ottumwa (Ia.) Gas Company, on the first inst., assumed the management of the Cedar Rapids Gas Company. Mr. A. J. Goss, of Cedar Rapids, succeeds Mr. Lambert in Ottumwa.

"B. L. T." forwarded this from Ottumwa, Ia., under date of the 4th inst.: "The Ottumwa Gas Company is now well established in its new office quarters an West Main Street, the hegira having been successfully accomplished the morning of the first inst. The present building, which occupies the site occupied by its predecessor, and which was destroyed by fire last October, is 166 feet by 22 feet, and two stories with basement. The main or ground floor room is a most attractive one, the walls being light buff in color, finished off with a miniature oak example of wainscoting, 4 feet high. It is illuminated by 9 large, handsome fixtures of the semi-indirect type, mercury control, from wall-switches; 14 sidewall, double brackets add materially to the lighting equipment. The front section of main floor is used for the display of ranges and water heaters; stand lamps, with other similar lamps, and fixtures, are shown in the windows, and are also placed on tables ranged along the side walls. The sales' and display rooms are in charge of the Company's Commercial Agent, Mr. H. B. Skellenger. The latter half of first floor is devoted to business office purposes, being separated from the front by a partition, pierced with windows for the convenience of the cashier, the order clerk, complaint clerk, etc. Back of the main business office is a room 15 feet by 15 feet, for the use of the Company's Manager, Mr. A. J. Goss, and back of that room are cloak and toilet rooms, an office supply cabinet, etc. The second floor will be given over to the occupying of shop foreman, C. S. Darvies and his aides. Here will be kept the reserve stock of stoves, fittings, fixtures and the like; and here also will be the center of the meter repairing and testing accomplishings. Lockers and showers are nicely arranged to the rear of the floor, and a dumb waiter connects all the floors of the building. The pipe and heavier fixtures, purchased by the Company in car load lots, are stored in the basement, where too is placed the simple heating plant for the structure. This comprises a plain gas water heater, the hot water being carried through radiators, quite after the fashioning in our many hot water systems. It is said that this is the largest example of this type of heating in modern buildings, and if the experiment is found practical for general use, a trial on a big scale will be made of the system in ordinary house heating practice. The regulation of the heat is determined by means of an electric thermostat, the range being within one degree up or down from 70°. The building is, besides being of exceeding use to the Company, a great addition to the office examples in Ottumwa.

MR. FREDERICK JONES, for years in the accounting service of the Brooklyn Union Gas Company, died, in his home, 114 Union avenue, Brooklyn, N. Y., the morning of the 4th inst. He was in his 42d year.

Utilities Commission News.

GEORGIA COMMISSION TO BE LIBERAL.—"There is need, as there are opportunities, for great industrial developments in Georgia. To fully meet this need and improve these opportunities, capital other than our own must be attracted. There is no surer way of doing this than at all times treating it and its owners fairly.

"There are hazards and risks in public utility investmen ts not always carried by private enterprises. There should be recognition of this in prescribing rates; they should allow some compensation therefor. Investors in public utility enterprises unquestionably surr ender, or rather have to yield, to governmental agencies in regulation and control of their rates and services. They are not free to do as they will with their property, nor get what they can out of it. They are subject to the will of the people whom they serve, and, having such power, it seems to us that there should be recognition at all times of corresponding obligations for at least fair treatment."

NEED NOT EXTEND IF NOT PROFITABLE.—The New Jersey Board of Public Utility Commissioners has rendered a decision in the complaint of Michael Carroll and others of South Bound Brook against the Public Service Gas Company, to order the extension of the Company's system on Canal Street. The Board refuses to order the extension unless the petitioners will guarantee the Company an income sufficient to afford a return of 8 per cent. on the investment involved.

RATE INVESTIGATIONS IN THE TWIN CITIES.—Since last May an investigation has been under way in the city of St. Paul, Minn., to determine whether there should be any change in the rates charged by the St. Paul Gas Light Company and the Consumers' Power Company for gas, electricity and district steam heating. Mr. E. W. Bemis, of Chicago, was retained by the city to make the investigation, and under his direction Mr. Charles L. Pillsbury, of Minneapolis, has made an engineering appraisal of the property of both companies, and Marwick, Mitchell, Peat & Company a study of their accounts. These having been turned over to Mr. Bemis are now be ing examined by him, and his report will be ready for presentation, probably next month.

Minneapolis is engaged in an investigation of the rates of the Minneapolis Gas Light Company. Since January 1 the consumers have been paying but 70 cents per 1,000 cubic feet, the former rate having been 85 cents. The case is, however, in the courts. Mr. William D. Marks the city's public utility expert, died during the pendency of the case, and Mr. Bemis has been retained in this hearing on the part of the city.

TO HAVE FULL INFORMATION AVAILABLE.—The Ohio Commission has issued an order that all public utility companies, with the exception of steam railroads, telegraph and sleeping-car companies, must furnish an itemized valuation of their properties before August 1, 1914, giving cost of reproduction, depreciation and net value. Such items as overhead expenses during time of theoretical construction, value of franchises or contracts, good will, going value, cost of financing and property owned but not used may be included. This step has been taken to aid the commission in fixing valuations when it is called upon to do so and to accomplish the work in the shortest time.

BOND ISSUES LOST BY TIE VOTE.—Three applications for bond issues from public service corporations failed of approval by the New York Commission, First District, during the first week in March by a tie vote in each case, Chairman Edward E. McCall and Commissioner George V. S. Williams voting in favor of and Commissioners M. R. Maltbie and J. Sergeant Cram against granting the applications. The applications were: From the New York Edison Co. for permission to issue $15,800,000 in additional capital stock; from the Astoria Light, Heat and Power Co. for $5,000,000 in bonds and $9,500,000 additional stock; from the Dry Dock, East Broadway and Battery Railroad, for the approval of a mortgage and the issue of $2,800,000 in bonds. This is not a final disposal of the applications, as they may be brought up again.

The Market FOR GAS SECURITIES.

The market for city gas shares was absolutely featureless during the week, and the volume of trading was the smallest reached for some time. The week preceeding Easter is always a dull one, but the period for 1914 was surely the banner one in this respect; for instance, yesterday (Thursday) not a trade was made in Consolidated. The nominal quotation for Consolidated at the close yesterday (the Exchange is closed to-day, on Good Friday observance), was 131½ to 133. Meanwhile the demand for gas bonds continues good. Yesterday $1,000 New York Light, Heat and Power 5's, brought 104½. Another sale, which shows how well good gas bonds are considered, is reflected in $5,000 Peoples Gas Light and Coke, refunding 5's, at 100⅝.

A bond issue which seems to possess unusually good features for a turn is afforded in Pub. Service Corp., New Jersey, 5's, at 91.

Brooklyn Union is also neglected at the nominals of a week ago—the trading in this high class security is also virtually nil. Peoples, of Chicago, is off 1½ for the week. Laclede common is fairly well held, at 96 to 98, although it seems very much undervalued at such figures. Pacific Gas and Electric is still below 40, the asking price being returned at 39½. Investors should remember, in connection with this Company, that the Exposition year will prove its banner year.

Massachusetts gas, common, at 91, is 1 up in the bid, and $4,000 of its 4½'s were sold yesterday at 91—a very low valuation. Washington (D. C.) gas, 5's, were in good demand recently, with sales of $10,000, in 3 lots, at a range of 107½ to 108½. The Railroad Commission, California, has authorized the San Diego Company to emit forthwith $23,000 prior 5's at a price not less than 85 per cent. of their face value.

The Coast Counties (Cal.) Gas and Electric Company, reports a surplus to credit, for 1913, of $76,435. The syndicate which underwrote an additional $1,416,000 common, Con. Gas. Electric Light and Power, Baltimore, has been dissolved. Stockholders of record absorbed 85 per cent. of the issue.

GAS STOCKS.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

APRIL 13.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$99,816,500	100	131½	133
Central Union Gas Co.—				
1st 5's, due 1927, J. & J.	8,500,000	1,000	101	103
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	101	104
Mutual Gas Co.	3,600,000	100	157	157
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	99	101
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	59	62
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98¼	100¼
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	98	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	100	102
Standard	5,000,000	100	102	104
Preferred	5,000,000	100	93	94
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	90	95
The Brooklyn Union	15,000,000	1,000	126½	130
1st Con. 5's, due 1948, M. & N.	15,000,000	—	102	103
Yonkers	399,650	500	180	—
Out-of-Town Companies.				
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	2	5
Bonds, 5's	5,250,000	1,000	59	60
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	509,000	1,000	97	100
Capital, Sacramento	500,000	50	—	95
Bonds (6's)	150,000	1,000	—	—
Cincinnati Gas and Electric Co.	29,500,000	100	7	9
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus Gas Light & Fuel Company	1,682,750	100	65¼	66¼
Preferred	3,026,500	100	33	35¼
Consolidated, Baltimore	13,460,084		118¾	119
Mortgages, 5's	3,400,000		—	—
General Mortgage 4½	10,661,000		—	—
Con. Gas Co., Baltimore City, 4½	2,751,000		—	—
Detroit Gas Co., 5's	381,000	1,000	75	80
" Prior Lien 5's	5,619,000	1,000	97	100¼
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Essex and Hudson Gas Co.	6,500,000	—	132	138
Hartford	750,000	25	190	200
Laclede Gas Co., St. Louis	10,000,000	100	97	100
Preferred	3,500,000	100	—	102½
Bonds	10,000,000	1,000	102¾	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	120	130
Massachusetts Gas Companies, of Boston	25,000,000	100	91	91¼
Preferred	25,000,000	100	93¾	94¾
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	
Montreal L. H.& P., Canada	2,000,000	100	221¾	222
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	5,000,000	22	189	190
Peoples Gas Lt. & Coke Co., Chicago	35,000,000	100	122	122¼
1st Mortgage	20,100,000	1,000	102	102½
2d "	2,500,000	1,000	104	—
Pacific Gas and Electric Co.	15,500,000	—	38	39
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105¼
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	105
Extension, 6's	900,000	1,000	112¾	115
General Mortgage, 5's	3,447,000	1,000	94	96
United Gas Imp. Co.	55,502,950	50	168	70
Washington (D. C.) Gas Co.	1,600,000	200	440	442
Western Gas Co., Milwaukee	4,000,000	—	—	—